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# THE MANY CRISES OF THE SOVIET ECONOMY

A Symposium  
Compiled by the

SUBCOMMITTEE TO INVESTIGATE THE  
ADMINISTRATION OF THE INTERNAL SECURITY  
ACT AND OTHER INTERNAL SECURITY LAWS

OF THE

COMMITTEE ON THE JUDICIARY  
UNITED STATES SENATE



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## INTRODUCTION

By Senator Thomas J. Dodd,  
Vice Chairman, Internal Security Subcommittee

### THE CRISES IN THE SOVIET ECONOMY AND THE QUESTION OF EAST-WEST TRADE

The purpose of this symposium is to make available certain background facts on the state of the Soviet economy, because this knowledge is essential to an intelligent consideration of the entire question of East-West trade, which is being debated with increasing fervor in the free world community. The symposium consists for the most part of previously unpublished studies, which the authors have made available to the subcommittee.

The simple fact that the Soviet economic system does not work and cannot work is at last beginning to win recognition.

Until quite recently, however, it was fashionable to believe that the Soviet economic system had a far higher growth rate than the free enterprise system, and to accept at face value, or near face value, the predictions that the Soviet would catch up with and surpass the United States before the close of the decade. This misreading was fed by the Soviet's early successes in space. It was simply taken for granted that these technological successes were characteristic of the general qualitative level of Soviet industry; whereas, in fact, these successes were achieved by concentrating in one narrow industrial section the best equipment and the finest technicians to be found in the Soviet Union. How uncharacteristic of Soviet industry "Sputnik" really was, is amply demonstrated by the documented facts presented in this study.

In his report to the 22d Party Congress, in October 1961, Khrushchev made this flamboyant announcement to the assembled delegates:

In the very near future the Soviet Union will occupy such a position in the international grain market that the imperialist gentlemen will begin to feel how our agriculture is expanding.

Less than 2 years after this unfortunate prediction was made, the news broke that the Soviet Union was in the world market for all the grain she could buy.

Since that time there have been a number of excellent studies of the permanent crisis in Soviet agriculture. There have also been some studies and articles relating to the growing difficulties of Soviet industry, downgrading the roseate prophecies of Soviet economic growth that were so popular only a few years ago.

What is still not realized is the scope or gravity of the Soviet economic crisis. The fact is that the Soviet economy is afflicted by not one but many crises. In addition to the crisis in agriculture, there is the general crisis in industry; there is the special crisis in quality control; there is the raw material crisis resulting from the contraction

of the Soviet raw materials base; there is the crisis in planning; and, above all and pervading everything, there is the crisis resulting from the lack of human incentive.

It is with a view to bringing together the available information on these various crises that the Senate Subcommittee on Internal Security has compiled the studies contained in this volume.

These crises persist from year to year because they are inherent in the very nature of communism. Indeed, they appear to grow from year to year, in the manner of compound interest, because the damage wrought in one year in one sector of the economy finds expression in enhanced form in other sectors of the economy at a later date.

#### THE CRISIS IN SOVIET AGRICULTURE

Failures in the harvest of agricultural crops have been occurring almost every year in various parts of the Soviet Union. The areas most often afflicted by drought are the Volga region, the Urals, western Siberia, Kazakhstan, and portions of the North Caucasus. Drought, however, is only one small part of the explanation.

Faulty planning, colossal bureaucratic blunders, inadequate equipment, an inadequate fertilizer industry and, above all, the total lack of human incentive in the system of collectivized agriculture, have all played their part in the making of the present catastrophe.

The following are only a few of the many startling facts that have been documented in the studies reproduced in this volume:

1. In September 1953 Khrushchev made the first of many boasts about the state of Soviet agriculture. He said that it was "the best and most highly mechanized in the world," and that the country had adequate reserves of grain and a surplus for export. At that very time, cereal yields were below prewar level, while per capita output (in 1953) was only 412 kilograms, compared with 527 kilograms in 1913, the year before World War I.

2. In 1962, corn made up 28 percent of the entire area sown to grain crops. Of the 37.2 million hectares of corn, only 7 million hectares were harvested as grain, the remaining 30 million hectares being cut green for silage.

3. In 1961, 193,000 tractors were reported to be inactive because the requisite repair parts were not available. In the same year, 21,000 grain combines and 20,000 forage harvesters had not been repaired by harvest time because of a shortage of parts.

4. The Soviet chemical industry supplies agriculture with grossly inadequate quantities of fertilizer, herbicides, insecticides, and veterinary pharmaceuticals. The production of fertilizer per acre was less than one-quarter that in the United States and less than one-eighth that in West Germany. Soviet specialists estimate that each year about 20 percent of the country's production of field crops is lost to pests and diseases, and the value of these losses is put at about 6 billion rubles annually.

5. The deadening effect of the collectivized farm system is illustrated by—among other things—the many reports of heavy damage to state crops because the peasants do nothing to keep the weeds under control. In the Altai Krai, for example, it was reported that the fields were a sea of weeds, making it difficult to see the grain, because there were three to four times as much wild oats and thistles as there was grain.

6. Conversely, the importance of the incentive factor is underscored dramatically by the figures for the private sector of Soviet agriculture. Collective farm regulations permit every family on the farm to have a private plot of land not exceeding one-half hectare, one cow, one pig, and a handful of sheep, goats, and poultry. In 1961 these private plots accounted for 3.3 percent of all the land under cultivation in the U.S.S.R. In that year the Soviet state received from this 3.3 percent of its farmland, 26 percent of all potato deliveries, 34 percent of all eggs, 15 percent of all wool, 14 percent of all meat and poultry, 7 percent of its green vegetables. Because the peasants sell much of their produce on the open market after making their deliveries to the state, these figures tell only a part of the story of the amazing success of private enterprise, to the extent that it is permitted to exist, in Soviet agriculture.

#### THE CRISIS IN SOVIET INDUSTRY

The true facts about the crisis in Soviet industry, in planning, in transportation and, above all, in quality control, are enough to stagger the imagination of anyone who has grown up in a free enterprise society.

Thus, we learn from the Soviet press that repair of existing machine tools occupies 3.5 times as many people as are actually employed in manufacturing new units; that electric motors, during their first year of life, spend 30 to 40 percent of their total working time undergoing repairs; that, at any given time, not less than 40 percent of all vehicles in the Soviet Union are idle, awaiting repairs.

The manner in which quality deficiencies in one industry lead to compounded difficulties in another industry was dramatically illustrated by an article in *Izvestiya* on May 5, 1964, dealing with the difficulties of the Kungur Machinery Plant. (The item is too recent to be covered by the studies of Soviet industry contained in this report.) The story as a whole is so preposterous that it seems like something out of the Mad Hatter's tea party.

The article said that, during the past 2 years, the Kungur plant had received from the Minsk Transfer Machine Plant 24 pieces of complex equipment used in the machining of turbo drill rotors and stators. The total cost of these transfer machines exceeded 2 million rubles. But because of major designing and engineering defects, *not a single one of the machines was operational*. This, despite the fact that the Minsk plant has sent to the Kungur Machinery Plant 45 maintenance people who had spent 5,330 man-days, costing about 80,000 rubles, in an effort to eliminate bugs in their transfer machines. Because of these difficulties, the Kungur plant had fallen seriously behind in its own plan for the production of spare parts for oil drilling equipment.

This entire fantastic story is capped by a fitting conclusion. The article notes that the Minsk Transfer Machine Plant, which produced the nonoperational machinery, is not only listed as having fulfilled the state plan, but is listed as a frontrunner in its industry and has received premiums for having surpassed its quota.

This is the state of Soviet industry and technology 46 years after the Russian revolution.

Another dramatic illustration of the progressive deterioration of quality and quality control in the Soviet Union is provided by an item on the television industry. In any normal civilized country, the general experience is that the quality curve of complex products rises from year to year as weaknesses are eliminated and design and methods of manufacture improve. In the Soviet Union the reverse is the case. Thus, a study of television failures during the guarantee period of 6 months after sale, revealed that the quality of sets has been deteriorating. In 1960, the percentage of failures during the first 6 months attributable to defective tubes was 47 percent. In 1961 it was 52 percent. And in 1962 it rose to 61 percent.

The question may be asked how this picture of Soviet industry can be squared with the formidable military establishment which the Soviet Union is known to maintain. The Soviet military establishment is indeed impressively equipped, and it would be foolish to underestimate it. The industry which feeds this establishment has been built up, without regard to cost, by ruthlessly starving virtually every other sector of the Soviet economy. For example, the pathetic underdevelopment of the chemical industry as a whole—and especially the chemical fertilizer industry—is directly related to the overconcentration of capital and effort in the Soviet defense industry.

This industry commands the best equipment, has access to the highest quality materials available, and employs the best qualified technical personnel. High precision measuring equipment, to the limited extent in which it is available to Soviet industry, is concentrated in the factories feeding the defense establishment. Production standards are more rigorous in these factories and inspection procedures are the severest to be found in the Soviet Union.

With all of these advantages, the Soviet defense industries have been able to turn out small weapons and artillery and tanks of good design and apparently acceptable quality.

About the quality and reliability of their missiles, there are no hard facts that would enable us to pass judgment, although there is plenty of reason for believing that they lag considerably behind the United States in reliability. It would be difficult to make any other assumption in view of the fact that even in the considerably less sophisticated sphere of aircraft production, their defense industries, despite the many advantages they enjoy, have turned in a questionable performance. For example, Prime Minister Khrushchev himself, in his statement of December 13, 1963, before the Communist Party Central Committee, said that:

\* \* \* up until recently Soviet aviation industry has been manufacturing aircraft engines with a service life of 500 hours, while the British engines have a life of 2,200 to 2,500 hours \* \* \*.

In addition, there is the fact that the quality of Soviet electronic equipment is so low that the Soviets prefer to trust the safety of their TU-104 and IL-18 airliners to British-made navigation equipment, and that even a Czech-produced Mig 15 fighter which crashed in West Germany was equipped with West German electronic equipment.

To summarize:

Instead of catching up with the West, and becoming less dependent on it, Soviet industry seems to be lagging further and further behind the West and to be growing more dependent on it. This is so because the technological explosion of the past decade has made modern

industry more dependent than ever on ultra-high precision and on the instruments capable of assuring such precision, on rigid standards of quality control, on sophistication of design and painstaking workmanship. These are precisely the areas where the Soviet Union is weakest and where the Soviet system raises the greatest obstacles to progress.

#### THE CRISIS IN THE SOVIET RAW MATERIALS BASE

The crisis in Soviet industry has been aggravated by the growing crisis in the Soviet raw materials base. Copper, tin, nickel, and lead are among the critical metals now in extremely short supply.

This crisis is due in part to the progressive exhaustion of high-grade ore deposits. But it has been further aggravated by faulty or inadequate equipment, backward technology, lack of capital, uneconomic mining procedures, and bureaucratic bungling.

Only a few years ago, Communist Party orators used to boast that the Soviet Union has the largest reserves of minerals in the world. As if in reply to these party orators, A. V. Sidorenko, Chairman of the State Geological Committee in the U.S.S.R., has pointed out that the Soviet Union has dropped 4,000 mineral deposits from the list of "reserves" because they were too poor to mine. Moreover, the average quality of new mineral deposits discovered in the Soviet Union has been dropping rapidly, and most of them are being found in the remote areas where development costs are high.

In April 1963, the Moscow periodical *Gornyy Zhurnal* complained in these words:

We cannot allow a ton of extracted polymetallic ore in the capitalist world to produce 90 to 250 kilograms of metal and bring in huge profits, while our ore produces only 40 to 85 kilograms of metal and great losses.

The low quality of Soviet iron ore, combined with the growing shortage of nickel, has resulted in a serious deterioration in the quality of steel used in the production of machinery and equipment. Thus, an official Soviet report points out that, whereas all the vital parts of automobile and truck engines should be made from cast iron having a maximum sulfur content of 0.02 percent, the Soviet metallurgical industry has been consistently delivering cast iron with a sulfur content of over 0.6 percent, or 30 times the prescribed maximum.

To compensate for the poorer quality of the iron and steel used, the Soviet technologists are obliged to make everything thicker and heavier and more cumbersome. But even then their equipment frequently breaks down.

The experience of those who have purchased heavy equipment from the Soviets because of its attractive price has not been a happy one. Thus, the Argentine State Petroleum Monopoly (YPF) in 1958 bought about \$38 million worth of equipment from the Soviet Union. YPF was obligated to pay for deliveries even though its own experts rejected most of the equipment because, to quote *La Prensa*, it was "of limited use owing to its imperfect design and excessive weight and unfavorable comparison with similar equipment already in use in the oil wells." *La Prensa* said that the derricks and electrical equipment supplied by the Soviets were also "of excessive weight and of a design such as to require constant repair and maintenance."

A special committee set up to report on the situation quoted numerous findings by YPF engineers such as "gave worst possible results



and have been withdrawn from service"; "of ancient design and rudimentary technique"; "inferior to machinery bought in the United States and other Western countries."

These are only a few of the many items of information on the state of the Soviet economy compiled in the studies contained in this report.

#### THE QUESTION OF EAST-WEST TRADE

I come back to the point that there can be no intelligent consideration of the question of East-West trade and, for that matter, there can be no intelligent negotiation with the Soviet, that does not take into account the state of the Soviet economy.

If the Soviet economy were healthy, if increased East-West trade were a matter of secondary importance to it, then obviously we could not pose conditions in discussing trade with the Communist bloc. But if the Soviets need such trade desperately, as the facts indicate they do, then this situation provides us with a leverage which should not be ignored.

Unfortunately, the debate on East-West trade has, by and large, been taking place without reference to these essential background facts. And as the debate goes on, the move toward greater trade with the Soviet bloc has been gathering momentum, with each passing month, within the countries of the Western alliance.

Chronologically, the turning point seems to have been the United States decision last October to sell \$200 million worth of wheat to the Soviet Union, without conditions of any kind and on highly favorable terms. Shortly after this deal was concluded, our British allies announced that they planned to sell several thousand buses to Castro, in defiance of the restrictive trade policy favored by the United States. On the heels of this, the French announced that they had contracted to sell several hundred locomotives to the Castro regime.

Announcements of new sales of industrial and chemical equipment to the Soviet Union and Communist bloc countries have come thick and fast. Our European allies seemed to have made up their minds that trade is good, that the existing restrictions are bad, and that the West must do everything in its power, both for political and economic reasons, to step up trade with the Communist countries. In an effort to promote such sales, our British allies have even abandoned the time-honored policy of limiting Soviet sales to short-term credit and have announced that they plan to grant long-term credits running to 10 and 15 years, for the purpose of hastening the expansion of such trade.

The entire structure of allied restrictions on trade with the Communist bloc, so painfully built up over the postwar years, now seems to be crumbling before our eyes.

Officially, the State Department has professed alarm over the attitude of our allies, in particular on the question of trade with Cuba. But the State Department's position vis-a-vis our allies has been weakened by our sale of wheat to the Soviet Union and by other evidences of ambiguity in our own policy. It is also weakened by the growing agitation in our own country for more trade with the Communist bloc.

Thus, the U.S. Chamber of Commerce, toward the end of April, adopted a resolution calling for a less restrictive policy. On the same

day, the North Atlantic Treaty Organization revealed that it planned to relax its embargo on sales of certain items to the Communist bloc. The American Bankers' Association has also adopted a resolution favoring increased East-West trade.

There are three discernible positions in the current debate on East-West trade.

The first position holds that all trade with the Communist bloc is a bad thing and only serves to strengthen the Communists at the expense of the free world. It holds that, by providing the Soviet Union with equipment they so desperately need, we are enabling the Soviet leaders to avoid a choice between guns and butter; that we are, in short, permitting Moscow to carry on its subversive operations and its armament program uninhibited, while satisfying, largely by imports, the needs of a growing consumer society.

The second position holds that increased trade constitutes the most effective method of easing cold war tensions. As one of our respected national columnists recently put it, "Trade is the best weapon of the true conservative, as the alternative to the ultimate weapon nobody wants to use, the weapon of war."

Our British allies have added another argument for this second position: that a well-fed Communist is apt to be less dangerous than a hungry Communist. Interestingly enough, however, the validity of this argument is not accepted by all those who favor increased East-West trade. Thus, Arthur Schlesinger, Jr., former special assistant to the President, wrote in 1960, after an extensive trip through the Soviet Union:

The unquestionable progress in the last half dozen years toward greater personal security and greater personal comfort may even have strengthened rather than weakened the dogmatic and ideological character of Soviet society.

The third position on East-West trade is an in-between position, which favors increased trade and even long-term credits to the Soviets *under certain conditions*.

In essence, this position boils down to the commonsense argument that, since the Soviets need our food surpluses and industrial equipment so desperately, since they want increased trade perhaps more than anything else, we should at least get something in exchange for selling them the things they want and for granting credit to them.

This position is shared by a remarkably broad spectrum of opinion. Thus, the renowned Soviet expert, Zbigniew K. Brzezinski of Columbia University, wrote in the Washington Post at the time of the wheat deal that we should at least have demanded the tearing down of the Berlin wall and other concessions on Berlin as the price of the deal. Professor Brzezinski is no anti-Soviet extremist. Indeed, he goes much farther than most people in his optimism over our future relations with the Soviets. He has even spoken of the possibility of a "grand reconciliation" between ourselves and the Soviet Union. But he accepts the essential fact that, if we present to the Soviets, on a platter, the trade and credits they so desperately require, we deprive ourselves of all bargaining power in our negotiations with them, and, in this sense, undercut the possibility of arriving at agreements designed to eliminate the true causes of world tension.

By and large, those who adhere to this in-between position have no illusions about Soviet intentions or about the Communist attitude toward East-West trade. They recall that Lenin once said:

\* \* \* It is necessary to bribe capitalism with extra profit. Capitalism will get the extra profit—God with it [begone] with this extra profit—and we will get the basics [equipment] with the aid of which we will strengthen ourselves, and will finally get up on our feet and defeat it [capitalism]. \* \* \*

They also recall the statement attributed to Lenin that “when the time comes to hang the capitalists, they will compete with each other to sell us the hanging rope.”

Those who hold this third position also have no illusions about the relative economic benefits that will accrue to the Western World on the one hand and the Soviet world on the other hand from increased East-West trade.

In terms of what it can contribute to American and Western prosperity, the potential benefits to be derived even from substantially increased trade with the Soviet bloc are so small as to be negligible.

In 1962 the United States exported \$21.7 billion worth of produce, accounting for 3.7 percent of our gross national product. Of our total exports, approximately one-half of 1 percent went to the Soviet bloc. *In short, we sold to the Communists approximately one five-thousandth of our gross national product.* Even if we were to double or quadruple our trade with the Soviet bloc, it obviously is not going to have a very significant impact on our national prosperity.

Our Western European allies, who have been going in so eagerly for trade with the Soviets, are very little more dependent than we are on this trade for their national prosperity. Thus, West Germany, the leading exporter to the Soviet bloc, sold only 5.6 percent of its 1962 exports, amounting to \$750 million, to the bloc. (It should perhaps be noted that less than a quarter of this trade was with the Soviet Union itself, while more than one-third of it consisted of inter-zonal trade with East Germany. The Germans feel that an argument can be made, in anticipation of ultimate reunification, for keeping the economies of East and West Germany interdependent and complementary.) Italy also sold to the bloc 5.6 percent of her total exports, amounting to \$240 million. In the case of France, 4.3 percent of her exports of \$405 million went to the bloc. In the case of the United Kingdom, sales to the bloc accounted for 3.6 percent of her total exports of \$393 million.

From these figures it should be clear that the Western countries would not become bankrupt even if the Soviet market were to disappear overnight.

Even the total figures on East-West trade and potential East-West trade are no true indication of the profits to be derived from such trade. There is reason to believe that the Soviets are now scraping the bottom of their reserves of gold and foreign currency. For example, they have recently informed the Canadian Government that they wish to make part payment for their purchases of Canadian wheat with Soviet oil. If there is to be increased trade with the Soviet bloc, therefore, it is clear that such trading can be arranged only on the basis of long-term credits.

Recognizing this fact, the British are already considering the extension of 15-year credits to the Soviet Union to finance purchases of equipment in Great Britain. It remains to be seen whether these

obligations will be met at the end of the specified period, or whether the Soviets will ask for one extension after another or, alternatively, offer to pay for their purchases with Soviet oil, which neither the United States or Great Britain would be willing to accept.

There is a very good chance, therefore, that increased trade with the Soviet bloc, undertaken in the name of profit, will ultimately wind up as a direct subsidy to the Soviet Government or, at best, as a partial giveaway.

If the profits to be derived from trade with the Communist bloc are marginal, the importance to the West of the commodities which the Communist bloc sells us in return is even more limited. From the Communist bloc we get furs and caviar and hams and some semi-finished goods. We also get oil, which is competing on an increasing scale with Western oil in the markets of the world. Only the tiniest fraction of our imports from the Communist bloc can be considered of cardinal importance.

On the Communist side, however, East-West trade, despite its apparently limited dollar volume, is not merely of critical importance: it may well be a matter of survival. The Communist bloc must have Western assistance not only in coping with its chronic agricultural crisis but it must also have such assistance to cope with the chronic deficiencies of its industries. Thus the Communists are constantly badgering the West for precision machinery for heavy and light industries; for equipment—and, indeed, for entire plants—for their chemical industries; for sheet steel and steel pipe; for electronic equipment, and so on.

Western exports to the Soviet bloc are important not so much because of their volume but because of the nature and quality of these exports.

When the Soviets shop for chemicals, they frequently shop for sample quantities, which they hope their industry will be able to reproduce, after analysis. Thus, last October there were two licenses for the amount of \$1, each covering the shipment of samples of synthetic resins to the Soviet Union.

When the Soviets shop for equipment, they shop for the most sophisticated equipment available in the Western World. A single shipment of machinery valued at several million dollars may suffice to give them a priceless capability that they would have no way of developing on their own.

#### THE SALE OF MINIATURE BALL BEARING MACHINES: A CASE HISTORY

This fact was pointed up in a particularly dramatic way by an investigation conducted by the Senate Subcommittee on Internal Security<sup>1</sup> in late 1960 and early 1961 into the proposed shipment of ultra-high-precision miniature ball bearing machines to the U.S.S.R.

The fact that these ball bearing machines were about to be shipped to the Soviet Union was brought to the attention of the Senate Subcommittee on Internal Security in December 1960. The export license had been approved by the Advisory Committee on Export Control. Both Secretary of Commerce Mueller and Secretary of Commerce Hodges, who succeeded him in January 1961, defended the decision on the grounds that the national interest would not be prejudiced;

<sup>1</sup> See report of the Senate Subcommittee on Internal Security, App., p. 69.

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INTRODUCTION

that it would, on the contrary, be served by the sale of these machines to the Soviet Union.

One of the first facts developed by the investigation was that the Defense Department had vigorously opposed the granting of the license because it considered the deal seriously prejudicial to our national security.

To obtain the expert opinion which the Department of Commerce had failed to obtain in granting the license, the subcommittee consulted 12 men recognized as top experts in the ball-bearing field. Their testimony established—

(1) That the miniature bearings, produced with the help of the Bryant machines—which the Soviet sought—have application primarily in missile guidance systems, firing control systems, and other sophisticated defense hardware.

(2) That there were 72 Bryant machines in operation in the United States; that all of the precision miniature bearings used by our Department of Defense were processed on these 72 machines; that 85 percent of the total output of miniature bearings went for military purposes.

(3) That the Bryant machine was the only machine obtainable anywhere in the world capable of mass producing high precision miniature bearings; that Soviet industry had been seeking desperately to develop a comparable machine, but had not been able to master the problems involved.

(4) That the possession of these machines would greatly accelerate Soviet mastery of the art of miniaturization and enhance the Communist military capability.

As one of the ball-bearing experts consulted by the subcommittee said in his report:

Our manufacture of these small devices is no secret—even the manner is not difficult to determine—but the capability to do it well and economically has taken years to develop and it should not be sold to a potential adversary. \* \* \* The situation is not one of selling our adversary a “club”—but a machine which helps to produce better “clubs” faster and cheaper.

Toward the end of February 1961, the subcommittee learned that the license for the export of the Bryant machines, which had been suspended in deference to its investigation, had been reinstated by the Commerce Department and the machines were in crates on the docks, ready for shipment. It was a situation that called for prompt action. It was decided to take the matter directly to President Kennedy. The President was shown the summary report of the committee. Since it was brief, he read it on the spot.

The shipment was called off that afternoon.

I think that this case history has importance because it illustrates the danger of overeagerness for East-West trade and the need for continuing care in the granting of export licenses, even if there should be an overall increase in East-West trade. If this could happen in the United States, then there is every reason to believe that there have been comparable lapses and perhaps much graver lapses in Western Europe, where there exists far less awareness than there does in the United States of the need for careful restrictions on the sale of sophisticated industrial equipment to the Soviet bloc.

## THE NEED FOR A CONCERTED WESTERN POLICY

The problem of East-West trade requires a concerted policy on the part of the West. If East-West trade is treated by each nation as a matter for unilateral decision, not merely will the West deprive itself of its greatest single instrument of leverage in future negotiations with the Soviets, but the unlimited competition implicit in such a situation will create grave dangers to Western security.

American policy on East-West trade has suffered from inconsistencies from its beginning. The Battle Act of 1951, which was intended to restrict the flow of strategic goods to the Communist bloc, has never been properly enforced. In particular, there has been no serious effort to apply the provision of the act which calls for cutting off aid to countries which ship strategic goods to the bloc. Moreover, despite the amendment to the Export Control Act of 1962 and the existence of an extensive list of strategic goods which were barred from export to the Communist bloc, the licensing of shipments to the Soviet bloc has followed no intelligible pattern. The result has been that responsible agencies of Government have sometimes given their approval to the export of items capable of strengthening the Soviet military machine.

Nor has there been anything resembling unanimity in Western policy. Through CoCom<sup>2</sup> and the so-called CoCom list, many items and materials have theoretically been barred from shipment to the Soviets. But the CoCom list has been very unevenly applied by its member nations, with the result that the Soviets have, even in the past, received from our NATO partners many shipments that we would consider clearly strategic.

Because of the imperfect nature of the controls that heretofore existed, the Soviet Union was able to obtain, from the United States and from its allies, an amazing variety of machine tools, heavy industrial equipment, transportation equipment, pipeline, and even entire chemical and metallurgical plants.

But at least there were some controls. At least the Soviets were debarred from a fairly long list of critical items that were obviously of strategic importance.

Now the danger is that the barriers will come tumbling down, both here and abroad, and the Communists will be able to purchase even the most sophisticated strategic equipment, in the name of business and coexistence.

Even if we accept the trend toward increased trade with the Communist bloc as inevitable and perhaps desirable, it would clearly be to the advantage of the free world to concert its policy. This will only be done if the United States takes the initiative in convening, through NATO, an allied conference on East-West trade.

Such a conference would serve the purpose of putting the expansion of East-West trade on a rational basis. The expansion of the list of commodities in which trade might be carried on, would not be left to hazard or to the avarice of profit-hungry businessmen.

Conversely, the participating nations could agree on a list of strategic items that would remain barred for export to the Communist bloc, and could consider the establishment of a mechanism somewhat

<sup>2</sup> Coordinating Committee for International Controls.

more effective than CoCom to enforce the ban on the sale of such commodities.

The conference could lay down general rules on the extension of credit.

It might wish to consider the problem of trading with the satellites in separate terms from the problem of trading with the Soviets. It might conceivably decide that, in the case of the satellites, trade should be used as a handmaiden of freedom, so that every show of national independence and every tangible increment in domestic freedom is rewarded by a further relaxation of trade and credit, while tendencies in the opposite direction are discouraged by restrictions on trade and credit.

But, above all, the conference should give consideration to the many-sided problem of relating East-West trade to Western diplomacy.

#### INCREASED EAST-WEST TRADE: AN HISTORIC DIPLOMATIC OPPORTUNITY

The Soviet economic crisis confronts us with an unprecedented opportunity to underscore the economic advantages of freedom, and the economic ineptitude of the Communist system. I hope we will take advantage of this opportunity.

But even more important, the Soviet economic crisis presents us with an historic diplomatic opportunity which, properly used, can make of East-West trade a true instrument for peace, stability and prosperity.

In any honest diplomatic negotiations between equals, there must be some give and some take on both sides—not all give on one side and all take on the other side, as the Soviets would like to have it. Since we are not prepared to barter away the freedom of other peoples, the two things we have to offer in which the Communist bloc is supremely interested are increased trade and long-term credits. And since we are not particularly interested in more furs or caviar, the one thing the Soviets have to offer that would have serious meaning for us is a true abatement of the cold war.

Since the Soviets require our grain, our equipment, our raw materials and our credits as a matter of the greatest urgency and perhaps even as a matter of survival, there is every reason to believe that a firm attitude on the part of the West will produce political concessions on the part of the Soviets.

The very least we can do is insist that, as a condition bailing the Soviets out of their manmade agricultural and industrial crises, the Soviets bring to a halt their subversive activities in this hemisphere and elsewhere. We might also insist that the Soviets respect the International Patent Convention and that they cease undercutting Western oil by selling oil at uneconomic prices. In return for certain specific concessions from the West in the realm of trade and credit, we might even ask that the Berlin wall be torn down and that the Soviets live up to their postwar agreements on the reunification of Germany through free elections.

Indeed, if Khrushchev really wants a reduction of tensions, there is no more effective measure he could take than to negotiate a package agreement with the West in which free elections in the captive nations, as prescribed by the Yalta Agreement, are exchanged for such conces-

sions as a European security pact, partial disarmament, increased East-West trade, and generous long-term credits.

Khrushchev might resist such a far-reaching proposal today. But the time may come when a combination of such factors as top-level disagreement within the Kremlin, growing unrest in the satellites, increased economic difficulties at home, and growing concern over Red China, may cause Moscow to welcome such an initiative.

The possibilities before Western diplomacy are limitless if we are prepared to use our economic bargaining power as an instrument for the extension of freedom. Within such a framework, increased East-West trade could be a boon to all the peoples of the world.

Increased East-West trade, conversely, may turn out to be a curse if the West is foolish enough to give it to the Communist bloc on a platter, demanding nothing in return. The outcome of every diplomatic negotiation will be compromised in favor of the Soviets. The Soviets will be further emboldened, by the lack of conditions and by the impression of Western timidity, to step up their subversive activities, while enjoying the benefits of increased trade.

The whole structure and foundation of Communist power, which today threatens the world, would have been impossible without the equipment and technical assistance and direct aid the Kremlin has received from the West during the four-and-a-half decades since the Bolshevik revolution. Let us hope that some future historian will not have to write that, by continuing to share the means of economic power with the Soviets without troubling to pose certain elementary political conditions, the great Western nations made themselves the instruments of their own destruction.

JUNE 2, 1964.



## THE SOVIET INDUSTRIAL CRISIS—I

SHODDY INDUSTRIAL GOODS FORCE THE SOVIETS TO SEEK OUT  
WESTERN TECHNOLOGY

By Joseph A. Gwyer

On November 7 of this year, Nikita Khrushchev told the world that the Soviet Union would catch up to the United States in industrial production by 1970. An idle boast? Possibly. Khrushchev has been saying this since 1958 and I presume that this will be his theme for the remainder of this decade should he remain at the helm of today's sprawling Soviet Empire. Soviet propagandists claim even today that the Soviet Union is already outproducing the United States in iron ore, coal, cement, machine tools, and that it is rapidly closing the gap in the production of pig iron, steel, and other basic industrial goods.

Khrushchev has said on more than one occasion that the Soviet Union will bury us in economic competition. One more boast? Possibly. We need not lie down to make his work easier. We must admit that the Soviets have been successful in some areas of the world, particularly among the underdeveloped nations. Let's recall the words of President Johnson who, as a Senator speaking in Washington on April 16, 1959, said: "Khrushchev has boasted that the Soviet Union will destroy us in economic competition. Khrushchev is no idle braggart. The Soviets have been working for years among the uncommitted people of the earth. It would be foolish to pretend that their work has not been effective \* \* \*." <sup>1</sup>

But are these boasts really indicative of the true growth of the Soviet economy or are they but the tools of an extremely skilled propaganda machine intent on creating an erroneous picture of the real status of Soviet industry? Since the West in general and the United States in particular must realize that the survival of the entire free world depends upon how well we can counter the Soviet Union's increasingly vigorous economic offensive, it is imperative for us to know the basis of Khrushchev's claims. Only by possessing a full knowledge of Soviet economic capabilities and limitations, and an understanding of the industrial problems facing the Soviets today, can we formulate an effective policy of positive action and dispense with the wholly reactive and ineffectual attitude that has characterized our posture since 1954. The Soviets for too long have gained advantage from American inertia and lack of economic aggressiveness. The intricate machinery intended to deny the Soviets the advantages of Western technology built into our agreements with our NATO Allies has today been heavily eroded in terms of the quality and effectiveness of its original scope, not because of any Soviet technological

<sup>1</sup> Johnson, Senator Lyndon B., "Positive Steps in Foreign Policy," an address before the Women's National Press Club banquet for the American Society of Newspaper Editors, Washington, D.C., Apr. 16, 1959, p. 3.

expertise, but rather because of our ineptitude in exploiting Soviet economic shortcomings.

The Soviet Union now has a new scheme to divide the ranks of the free world. It is a trade scheme designed to appeal to the European businessman and to his North American counterpart and it shows real signs of catching hold in Western Europe and elsewhere. Soviet timing is shrewd, well chosen. British, Japanese, West German, French, and Italian businessmen are in cut-throat competition. Buying is slow. Unemployment in some industries is rising. Along comes the Soviet Union with an offer to buy ships, pipes, metalworking equipment, whole fertilizer plants, and now wheat—all of these commodities piling up for want of markets. The plum dangled before the West's nose is very tempting, but it may conceal a worm. The West has far less to gain from this trade than the Soviet Union or any of its satellites, and it has every reason to approach it with caution. Such trade may temporarily ease our balance of payments; it will certainly help perpetuate the Soviet state.

As long as the Soviet Union remains unyielding and uncooperative on the major issues that divide the world, we would be throwing away one of the few trump cards we hold by succumbing to "tempting" trade deals.

We must begin firstly by plugging up the leaks in the already greatly eroded international mechanism by which the free world has been restricting East-West trade in strategic goods. Only then can the free world use its economic strength to make the Soviet Union positive propositions of expanded trade in return for clear acts of political cooperation. We must also begin by analyzing Soviet weaknesses and capabilities, because only then will we be in a position to sense their forthcoming trade moves. Khrushchev is placing heavy emphasis on the growth of his manufacturing industry as a means of attaining his goals. Just how far along is the Soviet Union toward his goal? How much of Soviet vaunted all-out industrial drive is fiction? How much is fact? How fast is the Soviet Union gaining on us, if at all? To what extent is the substandard quality of Soviet industrial and consumer goods impeding Khrushchev's drive "to bury us"?

Khrushchev complained, on April 24, 1963, that his country spends annually more than 7 billion rubles on repairs of capital equipment, that this job keeps over 2 million workers and 800,000 metal-cutting machine tools constantly busy.<sup>2</sup> He also pointed out the shoddy manufacturing practices resulting in inferior production which "inflicts great losses on the Soviet economy and undermines the prestige of the Soviet state in international markets." It appears that the figure of 7 billion rubles was quite a conservative estimate in the light of recent revelations by A. N. Dem'yanovich, currently the Deputy Director of the Committee on the Coordination of Scientific Research, who stated that the current annual repair bill caused by faulty production runs at about 15 billion rubles.<sup>3</sup>

Whether 7 or 15 billion rubles—this is a fantastic figure, almost astronomical in the light of economic difficulties confronting the Soviets today.

<sup>2</sup> Borisov, Yu. S., "Most Pressing Problems Facing the Development of Repair Services," *Mashinostroitel'*, No. 9, 1963, p. 10.

<sup>3</sup> Dem'yanovich, A. N., "On the Work of the Scientific Council To Raise the Reliability and Service Life of Machines, Equipment, and Instruments," *Vestnik mashinostroyeniya*, No. 10, 1963, p. 86.

Nikita Khrushchev, in his 9th of December speech before the Communist Party's Central Committee, stated that the 1964-70 plan for the development of the chemical industry calls for outlays amounting to 42 billion rubles, including 25 billion rubles for chemical plants and 8 billion for the development of additional raw materials and electric power requirements. Translated into an average annual outlay, this amounts to about 6 billion rubles, a figure 1 billion rubles less than the annual equipment repair outlay figure cited by Khrushchev on April 24, 1963, and 2.5 times lower than the one cited by A. N. Dem'yanovich.

Official Soviet statistics do not provide information on the quality of goods the Soviet Union claims to manufacture in abundance. The official growth rates of Soviet economy which Mr. Khrushchev uses in trying to convey to the world the idea that his country is well on the way to catching up with the United States are, by themselves, meaningless because they are based on items which have reached relative saturation level on the U.S. market. Consequently, the most obvious method of appraising the achievements of a technological society is by evaluating its product, that is, the quality and reliability of the goods this technological society manufactures.

For the answers to these current problems confronting the Soviets we must go to their technical publications, literature, and press. From these sources, this article will attempt to survey (1) machine tools, (2) chemical equipment and chemicals, (3) electronic and electrical engineering equipment, (4) tractors and trucks, (5) consumer goods, (6) military hardware, and to comment on the economics of unreliability and the existing gap between theory and practice confronting the Soviet engineer today.

#### MACHINE TOOLS

Decentralized production facilities, inadequate applied research, and defective production are keeping the Soviet machine tool industry technologically backward. Since machine tools are of central importance to the achievement of industrial and obviously military capability, it would be helpful to assess where the Soviets stand in this respect. Statistics released by the Soviets seem to indicate that they are producing more such equipment than the United States. Figures for 1962 indicate that the U.S.S.R. output of both cutting and forming machine tools exceeded 200,000 units. On the surface these figures are impressive, but further analysis of data entering the overall production figure raises serious doubts. What is not shown is the figure showing how many failed to operate either at the end of the assembly line or days or weeks later after costly and labor-consuming installation at the place of consignment. As of April 1, 1962, the Soviet Union reported a metal-cutting tool inventory of 2.4 million units. When one considers that, of these, about 800,000 are undergoing repairs at an annual cost amounting to 1 billion rubles—a sum greater than that spent on the production of new machine tools—that repairs of existing units occupy 3.5 times as many people as there are actually employed in manufacturing new units, and that about 800,000 units and 2 million workers are busy machining spare parts for trucks, tractors, electrical motors, and a host of other equipment in repair shops scattered throughout the Soviet Union,

the overall picture of "equipment abundance" is not at all impressive.<sup>4</sup> The figures of useful operating time between breakdowns on machine tools would put U.S. industry out of business--it is intolerable.

Over 50 percent of metal-cutting machine tools annually produced by the Soviets are lathes and drills. The decentralization of production facilities tends to jack up the cost of new units and makes the manufacturing process, with few exceptions, slow, inefficient, and tedious. In its production planning, the U.S.S.R. has failed to meet the demand for forming equipment. As one knowledgeable Soviet official said: "The growth in the output of metal-forming units is too slow and the growth in the output of metal-cutting machine tools too rapid."<sup>5</sup> As of April 1962, metal-forming units constituted 20.3 percent of all Soviet machine tool stocks.<sup>6</sup> In some areas this figure is much lower. For instance the inventories of Moscow machine tool plants show that only slightly more than 5 percent of all units are metal-forming equipment.<sup>7</sup>

The average age of a metal-cutting machine tool is 12 years. If the situation in the Leningrad Economic Council is representative of that obtaining in the Soviet Union, machine tools are aging at a rate twice as great as their replacement. The inventories of that area increased by only 14 percent during the past 4 years.<sup>8</sup> This information raises the question: Are the Soviets manufacturing as many machine tools as they claim? Since the equipping of newly commissioned production facilities depends also on the plan fulfillment for metalworking equipment by machine tool plants, the following information suggests that the overall production figures for machine tools are inflated by 100 percent. A. I. Kostousov, Chairman of the State Committee for Automation and Machinery Manufacturing, said that a survey was made in 1961 of the construction sites of the 328 most prominent industrial objectives scheduled to take up about 70 percent of the total volume of capital investment in machine manufacturing. Data show that plants about to be commissioned received only 40 percent of the earmarked metal-cutting machine tools, 31 percent of the metal-forming units, and 20 percent of the conveying equipment. It is obvious that the plan was not fulfilled. Commenting on this, Khrushchev said that such planning results in nothing other than "trickery resulting in nothing but harm \* \* \*."<sup>9</sup>

There is a glaring lack of transfer machines. As early as 1963, the Soviet Union had only 340 transfer machines and not all functioning.<sup>10</sup> The difficulties encountered by the users of these transfer machines stem basically from the fact that too many institutes and design bureaus use their own assemblies in developing unit-type machine tools and transfer machines, the latter composed of unitized machine tools. This policy led to a situation where parts and assemblies of units coming from the SKB-8 (Design Bureau) (Minsk) differ from identical by designation parts and assemblies developed by SKB-1 (Moscow).<sup>11</sup> One-third of the output of the Minsk plant for transfer

<sup>4</sup> Dem'yanovich, A. N., "Technical Progress and Problems of Increased Reliability and Service Life of Machines," *Vestnik mashinostroyeniya*, No. 1, 1963, pp. 5-6. Also *Ekonomicheskaya gazeta*, Sept. 14, 1963, p. 18.

<sup>5</sup> Kheyman, S., "A Progressive Branch Structure for the Industry," *Kommunist*, No. 11, July 1963, pp. 84-85.

<sup>6</sup> *Ibid.*

<sup>7</sup> *Ekonomicheskaya gazeta*, Nov. 23, 1963, p. 11.

<sup>8</sup> *Ekonomicheskaya gazeta*, June 8, 1963, p. 5.

<sup>9</sup> *Pravda*, Nov. 21, 1962, p. 4.

<sup>10</sup> *Ekonomicheskaya gazeta*, July 20, 1963, p. 5.

<sup>11</sup> Vasil'yev, G., *Izvestiya*, Aug. 31, 1963, p. 3.

machines supported by SKB-8 was found to have serious design deficiencies. Four transfer machines delivered in April 1962 to the Volgograd tractor plant are still idle today because of uncorrected defects.<sup>12</sup> During the past 3 years the ZIL (Likhachev) automobile plant in Moscow received 47 transfer machines instead of the 205 units stipulated by the plan.<sup>13</sup>

Numerous new machine tools and instruments supplied to 1-GPZ (first state bearing plant) in Moscow do not have the required precision and often arrive with substandard and even defective assemblies and components. During the past 4 years 1-GPZ acquired substandard machine tools from the Leningrad machine tool plant im. Ilich, the Kiyev plant im. Gor'kiy, Yeysk, Ryazan', Khar'kov and Saratov plants. The record for substandard quality was attained by the Moscow "Stankoagregat" plant which shipped 90 machine tools not suitable for inclusion in production lines. Out of 283 units acquired from all the above plants, 35 were returned to the plant of origin classified as wholly defective, 167 were installed in production shops but were not functioning as of August 1963 because their defects have not been corrected. According to V. Gromov, manager of this largest bearing-manufacturing plant in the Soviet Union, the existing quality control in machine tool manufacturing plants does not assure the required quality of equipment. The testing of assembled special-purpose machine tools is carried out mainly without loads on a limited number of piece parts. Stand testing of assemblies is not included in the program and the control by OTK (Division for Technical Control) of parts and assemblies is very superficial.<sup>14</sup> Only about 1 percent of all equipment installed in Moscow machine tool plants is that for mechanization and automation of supporting operations. Almost 25 percent of all workers in these plants are busy in loading and unloading transport and storage activities.<sup>15</sup> The output of spare parts and assemblies for the repair of machine tools amounts to little more than 1 percent of the total output of the Soviet machine tool industry. In comparison, the U.S. share of spare parts is 17 percent and West Germany about 11 percent.<sup>16</sup>

High precision machine tools are produced in the Soviet Union only in very limited quantities. Production of these is held back by the absence of precision measuring equipment, balancing machines, reliable relays, etc.<sup>17</sup>

In October 1962, the Central Statistical Administration of the U.S.S.R. conducted a survey of 500 machine manufacturing plants in order to determine the extent of equipment utilization. The survey showed that, of the 172,000 metal-cutting machine tools, 24 percent were idle during the first shift, 39 during the second, and 78 percent during the third. Of the 24,300 units of metal-forming equipment surveyed, 26 percent were idle during the first shift, 38 percent during the second, and 76 percent during the third.<sup>18</sup>

The inability of the Soviets to design and manufacture precision machine tools in commercial quantities prompted them to turn to the West. Today, the U.S.S.R. is importing much of its precision ma-

<sup>12</sup> Ekonomicheskaya gazeta, Nov. 23, 1963, p. 12.

<sup>13</sup> Borodin, P. D., "The Increase of Effective Performance of Machinery Manufacturing Is the Most Important Objective," Vestnik mashinostroyeniya, No. 4, 1963, p. 8.

<sup>14</sup> Izvestiya, Aug. 10, 1963, p. 3.

<sup>15</sup> Ekonomicheskaya gazeta, Nov. 23, 1963, p. 11.

<sup>16</sup> Borisov, Yu. S., op. cit., p. 12.

<sup>17</sup> Izvestiya, Nov. 11, 1963, p. 2.

<sup>18</sup> Sovetskaya Kirgiziya, Aug. 20, 1963, p. 3; also Vestnik statistiki, Nov. 9, 1963, pp. 53-55.

chinery. West Germany, Great Britain, Italy, France, and Switzerland supply much up-to-date machinery including such items as transfer machines, grinders, multispindle automatic lathes, etc. Even U.S.-made equipment, although barred from the Soviet Union by our export control, may be sold to West European nations, and winds up in Soviet plants.

Contrary to official propaganda claims, the satellite nations are reluctant to use Soviet-made metalworking equipment. Czechs, Poles, Rumanians, and Bulgarians would rather have Western equipment, and the proof lies in the fact that they are avidly shopping in Western Europe for such. The largest automobile plant in Czechoslovakia, the 250,000-car-per-year plant at Mlada Boleslav, is being equipped with French Renault transfer machines, Italian Giustina grinders, West German Werner grinders, and British Birlac, Newall, Churchill, Red Ring, and Fisher & Ludlow equipment.<sup>19</sup>

#### CHEMICAL EQUIPMENT AND CHEMICALS

The underestimate of the importance of accelerated manufacture of chemical machinery permitted by Soviet planning agencies can be seen in the following figures: the share of chemical equipment in the overall production of machinery in the Soviet Union is only 0.66 percent, while in the United States the figure is 0.98 percent, in Great Britain 1.4 percent, and West Germany 1.8 percent. Furthermore, when in 1960 the share of capital investments in chemical machinery manufacturing was 2.8 percent of all investments in the chemical industry, this figure dropped to 1.8 percent in 1963. Soviet chemical engineering plants responsible for the design and construction of equipment for the chemical industry, despite some gains in overall output during the past 5 years, failed to produce standardized and reliable equipment. Contributing causes appear to be the unrealistic planning at all administrative levels and the overlasting present desire by individual manufacturers to fulfill the plan even at the expense of the ultimate users of equipment they do turn out in increasing quantities. A recent survey of chemical engineering plants shows there is too little specialization and also very limited standardization of equipment, assemblies, and parts. Today, the machinery manufacturers located in the Ukrainian Republic turn out about 4,000 types of machines and equipment for the chemical industry. In the Kiev Economic Council (Sovnarkhoz) alone the builders employ over 400 types of reduction gears, 500 kinds of armatures, and over 1,000 types of low-voltage equipment. This situation makes line production very difficult and time consuming.<sup>20</sup> Because of it, most of the manufacturers of equipment are usually late in deliveries thus delaying the commissioning of new production capacities. The delays in deliveries, although quite serious in implications, are a relatively minor impediment, the major being the obsolescence and defectiveness of equipment actually delivered to the customer. Commenting on the "modernity" of chemical machinery, L. Kostandov, Chairman of the State Committee on Chemical and Petroleum Machinery, stated:

It is not paradoxical that the chemical and petroleum processing machinery manufacturing is the only industrial branch which as of now is still without

<sup>19</sup> *Automotive Industries*, Nov. 1, 1963, pp. 29-32; also *Metalworking News*, Oct. 7, 1963, p. 1.

<sup>20</sup> Editorial, *Mashinostroitel'*, No. 11, 1963, pp. 1-2.

specialized design institutes and it does not have as of now a single industrial engineering institute? Such a situation has often led to a duplication of designs, with the designs themselves being remote from the modern requirements.<sup>21</sup>

What about the quality? It would take volumes to list the instances of defective equipment delivered to existing and newly commissioned chemical plants. Following are only few instances:

Sumy machinery plant im. Frunze and Kiyev "Bol'shevik" plant, the latter manufacturing equipment for rubber and plastic processing, are defaulting on deliveries of equipment because of difficulties encountered in assembling non-standard units.<sup>22</sup>

Moscow's planning institut "Giprokauchuk" has been planning and designing for over 10 years the Omsk synthetic rubber plant and the latter has not as yet reached its planned capacity.<sup>23</sup>

The Balashikha machinery plant delivered to the Sterlitamak chemical plant and to the Salavat petrochemical combine air fractionating units containing 40 percent of defective parts and components.<sup>24</sup>

Defective compressors were shipped to the "Severonikel" combine by the Kazan' and Melitopol' machinery plants.<sup>25</sup>

Repair and maintenance personnel comprises 30 percent of all workers employed in the chemical industry.

Over 4,000 defects were found in the equipment manufactured by the Novokramatorskiy machinery plant intended for the 2,300/1,700 rolling steel mill complex currently erected at the Chelyabinsk metallurgical plant.<sup>26</sup>

The Penza chemical machinery plant manufactured substandard absorbers for the Dneprodzerzhinsk fertilizer plant; vulcanizers made by the Tambov chemical machinery plant for the Omsk tire plant, and the equipment manufactured by the Tambov boiler plant, Tambov "Komsomolets" plant, and Morshansk "Khim mash" have been classified as defective.<sup>27</sup>

The chemical industry requires a large volume of armature, pipeline components, flanges, etc., made of heat-treated high-quality carbon, alloy, and stainless steels, capable of withstanding high pressures during the manufacture of polyethylene. The output of these fittings has been declining from year to year and it continues to do so now.<sup>28</sup>

United States produced in 1962 about 18.5 million tons of pulp compared with 2.6 million tons for the U.S.S.R. This evident lag is explained by the Soviets as stemming from obsolete and substandard papermaking machinery manufactured currently by the Soviet industry. Today, all newly built paper mills in the U.S.S.R. depend heavily on equipment manufactured abroad, imported mainly from Finland, Great Britain, West Germany, France, Japan, and other Western countries.<sup>29</sup>

Soviets manufacture very few high precision instruments, and of these, such as chromatographs perform unsatisfactorily. There is a dearth of instruments for automatic analysis. Because of the lack of such instruments, plants as a rule cannot inspect incoming materials and thus receive raw materials with foreign admixtures and also contaminated reagents.<sup>30</sup>

Because of the inability of the chemical industry to supply sufficient quantities of synthetic ethyl alcohol, the Soviet Union in 1962 was compelled to divert into the industry an equivalent of 1.5 million tons of grain or 4.4 million tons of potatoes.<sup>31</sup> This situation perhaps explains Soviet attempts to purchase 300,000 tons of industrial alcohol valued at about \$55 million from the United States.

G. I. Voronov, Premier of the Russian Republic, stated that from 15 to 20 percent of the present production of fertilizer (17.3 million

<sup>21</sup> Izvestiya, Dec. 4, 1963, p. 3.

<sup>22</sup> Editorial, Mashinostroitel', No. 11, 1963, pp. 1-2.

<sup>23</sup> Ibid.

<sup>24</sup> Stroitel'naya gazeta, Oct. 23, 1963, p. 1.

<sup>25</sup> Ibid.

<sup>26</sup> Ibid.

<sup>27</sup> Ekonomicheskaya gazeta, Nov. 9, 1963, p. 39.

<sup>28</sup> Pravda, Nov. 19, 1963, p. 2.

<sup>29</sup> Zheludkov, A., "Development and Growth of the Pulp Paper Industry," Voprosy Ekonomiki, No. 10 1963, pp. 139-140.

<sup>30</sup> Ekonomicheskaya gazeta, Nov. 9, 1963, p. 7.

<sup>31</sup> Ekonomicheskaya gazeta, Nov. 23, 1963, p. 8.

tons in 1962 and about 20 million tons in 1963) is being lost in transportation and storage. Mountains of fertilizer left in the open were a common sight in the Soviet Union during the winter of 1962-63. A remarkable monument to Soviet negligence was visible for several months along the sidings of the Mechetinskaya railroad station (Rostov oblast) where over 1,000 tons of the so "precious" fertilizer were exposed to the weather. Even today, despite the great cry for more fertilizer, over 500 tons remain in the open on the Lezha railroad station siding, not far from Moscow.<sup>32</sup> The fact that the Soviets are lacking the necessary facilities for loading, transport, unloading, storage, and finally for application of fertilizers has been generally well publicized by the Soviet press. This has been restated as recently as December 1, 1963, by I. Volovchenko, U.S.S.R. Minister of Agriculture. Mr. Volovchenko added that Soviet-produced fertilizers are of questionable value since they do not contain enough nutrients and have too much ballast (inert substances). Among phosphates, about 30 percent are phosphorite fertilizers from which phosphor is not readily taken up by plants. About 50 percent of potassium fertilizers contain raw potassium salts such as sylvite and kainite. Since mineral fertilizers are moved in bulk they pack rather easily during transport necessitating the use of crowbars and picks for unloading.

The plans to expand the facilities at the Soligorsk potash combine during 1963-64 are threatened by the inability of the Soviet industry to design and manufacture modern mining equipment.<sup>33</sup> There is no doubt that this situation prompted the Soviets to seek out such equipment in the United States. On August 21, 1963, the Department of Commerce issued an export license authorizing the shipment to the U.S.S.R. of combination potash cutting and loading machines and related support equipment valued at an estimated \$10 million. Shortly afterward, on September 10, 1963, the Department of Commerce issued a license for technical data "to support quotations on an entire fertilizer plant" for the Soviet Union.

#### ELECTRONIC AND ELECTRICAL ENGINEERING EQUIPMENT

The two most pressing problems facing the Soviet electronic industry today are the difficulties associated with increasing the reliability and service life of electronic equipment and with building up modern technology capable of producing large quantities of electronic components. Lack of special equipment and a dearth of high quality materials precludes the production of high-quality, small-size, heat-stable electronic components.<sup>34</sup>

The reliability of an electronic device may be guaranteed only when, during the production process, the manufacturer employs the necessary radioelectronic measuring and testing equipment. Yet, the radioelectronic industry is not doing the job to develop such equipment on a satisfactory scale. There are not enough specialists to do the job. In comparison with the chemical, aviation, textile, and food-processing industries, the electronic industry, in terms of specialized VUZes (higher institutes of learning), occupies the last place. In schools where electronics are taught as individual specialties, the

<sup>32</sup> Gudok, Oct. 28, 1963, p. 3; *Izvestiya*, Nov. 2, 1963, p. 4.

<sup>33</sup> *Stroitel'naya gazeta*, Nov. 24, 1963, p. 2.

<sup>34</sup> *Ekonomicheskaya gazeta*, Mar. 2, 1963, p. 7.



teaching process too often includes outdated programs and curricula, archaic laboratory equipment and measuring instruments.<sup>35</sup>

The production of high-quality electric insulating materials, conductors, and cables of new designs is retarded because of critical shortages of polychlorvinyl, polyethylene, epoxy resins, and silico-organic varnishes. Shortages of lavsan films, synthetic varnishes, and enamels preclude the design and development of a new series of electric motors up to 100 kilowatts in capacity. The same situation exists in areas requiring glass fibers, micanite paper, and mica. Transformer steel is currently produced in an inadequate volume and of insufficient quality, the latter not corresponding to modern engineering requirements. Estimates have been made that improvements in cold-rolling techniques of transformer steel could save the Soviet 1 billion kilowatt-hours per year, and would eliminate the need for 20,000 to 25,000 tons of transformer steel by 1965.<sup>36</sup>

The Soviet Union manufactured in 1960 about 3 million electric motors (0.6 kilowatt or more), having a total capacity of 25 million kilowatts, valued at 300 million rubles. The value (not depreciated) of all electric motors (0.6 kilowatt and above) installed in the U.S.S.R. is estimated to be about 1.45 billion rubles. The magnitude of repairs and maintenance caused by substandard quality and low reliability of the equipment can be seen in the fact that in 1960 about 10 million kilowatts of motor capacity underwent general overhaul. This overhaul, coupled with other repairs and maintenance, cost, in 1960, 1.2 billion rubles, required a staff of 350,000 people—of whom 10 percent were engineers and technicians—and consumed 25,000 tons of copper.<sup>37</sup>

Downtime of new electric motors during their first year of life amounts to 30 to 40 percent of the total working time.<sup>38</sup>

#### TRACTORS AND TRUCKS

There were 1,168,000 tractors on Soviet farms in 1962. The substandard quality of these is established by the fact that each tractor has to undergo repairs every year at an average cost of 30 to 40 percent of the original value. The most widely used tractor, the DT-54 model, weighing 5.1 tons, requires annually an average of 1 ton of spare parts and this does not include bearings, instruments, and electrical equipment. The total cost of spare parts for farm tractors in 1962 exceeded the outlays for the procurement of new tractors during the same year. Analysis of causes contributing to a very short service life and low reliability were found to be (1) insufficient resistance to wear of parts manufactured by tractor plants, (2) low quality of components manufactured by subcontractors (generators, pistons, cylinder sleeves, valves, fuel equipment, etc.), and (3) low quality of fuels and lubricants.<sup>39</sup>

In 5 months of 1962, 36 percent of oil filters for the SMD-14 tractor manufactured by the Chaplygin plant and 28 percent of

<sup>35</sup> Ibid.; also Shokin, A., and N. Devyatkov, "Electronics and Technological Progress," *Kommunist*, No. 1, 1963, pp. 65, 68.

<sup>36</sup> *Ekonomicheskaya gazeta*, Aug. 17, 1963, p. 3; also *Byulleten tekhniko-ekonomicheskoy informatsii*, No. 1, 1963, pp. 78-79.

<sup>37</sup> Tishchenko, N. A., "Reliability of Electric Motors," *Elektrichestvo*, No. 12, 1961, p. 19.

<sup>38</sup> Klimentenko, K. I., and I. M. Budnitskiy, "Economic Problems of Technological Progress," *Vestnik AN S.S.S.R.*, No. 4, 1963, p. 51.

<sup>39</sup> Dem'yanovich, A. N., "Repairs and Maintenance Are Needed," *Mashinostroitel'*, No. 3, 1963, p. 45.

starters for the same built by the Khar'kov plant were classified as defective. Up to 40 percent of rubber products supplied to tractor assembly plants by subcontractors were found to be unusable.<sup>40</sup>

"From 10 to 15 percent of the output of some tractor plants is returned for a rework in order to eliminate defects; the percentage of defective production in plants manufacturing agricultural implements exceeds 15 percent," these were the findings of the State Committee on Automation and Machinery Manufacturing which inspected the output of 80 manufacturing establishments.<sup>41</sup>

A similar situation exists in respect to 790,000 trucks used on Soviet farms in 1962. The utilization of trucks in the U.S.S.R., due to the short service life and poor maintenance, is at an extremely low level. Truck repairs during the past 5 years swallowed as much money as the new addition to the pool. Despite these outlays not less than 40 percent of vehicles are idle awaiting repairs. As direct result, the Soviet Union today has frozen transport facilities exceeding in value the annual output of all automotive plants.<sup>42</sup>

#### CONSUMER GOODS

If complaints in the Soviet press are any guide, the flow of shoddy products, from shoes to washers and television sets, is throwing Khrushchev's promises of more consumer goods off stride. It is disrupting factory schedules, loading scarce warehouse space with unwanted goods, and causing unrest among the people. Let's take shoes for example. Commercial inventories show an accumulation of 1.5 billion rubles of standard (combination cloth and leather) shoes which no one wants to buy because they are too heavy.<sup>43</sup> Yet, the price that is demanded for these runs at 7 to 15 percent of the take-home pay of an average Soviet wage earner.

A Republic-wide inspection of the consumer goods quality, conducted by the Russian Republic Ministry of Trade in 1962, revealed that 47 percent of the 16.5 million pieces of consumer goods checked at random were either defective or substandard. A breakdown of this figure shows that 39 percent of textiles, 42 percent of tailored and knitted goods, and 41 percent of leather shoes had to be either rejected outright because of defects, or reworked and downgraded. Similar large-scale inspection in the Ukrainian Republic showed that one-third of consumer goods in these three categories were substandard.<sup>44</sup>

Sixty percent of the television sets sold in 1961 failed to work during the "guaranteed" period of 6 months, according to N. Psurtsov, U.S.S.R. Minister of Communication. According to the Ministry of Trade of the Russian Republic, during 1962 about 20 percent of all sets manufactured had to undergo "presale" repairs. A study of failures revealed that the quality of sets is worsening from year to year. While in 1960 the percentage of failures attributable to defective tubes was 47 percent, it rose to 52 percent in 1961, and to 61 percent in 1962.<sup>45</sup>

<sup>40</sup> "In the State Committee of the Council of Ministers of the U.S.S.R. on Automation and Machinery Manufacturing," *Mekhanizatsiya i avtomatizatsiya proizvodstva*, No. 1, 1963, p. 58.

<sup>41</sup> *Ibid.*

<sup>42</sup> Dem'yanovich, A. N., "Repairs \* \* \*," *op. cit.*, p. 45.

<sup>43</sup> Orlov, Ya., "On Increasing the Quality of Consumer Goods," *Voprosy ekonomiki*, No. 1, 1963, p. 54.

<sup>44</sup> *Ekonomicheskaya gazeta*, Nov. 23, 1963, p. 12.

<sup>45</sup> *Ekonomicheskaya gazeta*, Mar. 2, 1963, p. 12; Apr. 13, 1963, p. 38.

Number dialing mechanisms of telephones manufactured by Latvian and Perm economic councils have an expected life of 55 hours of continuous dialing instead of a normal life expectancy of 500 hours.<sup>46</sup> Automatic pay phones, according to a check by the U.S.S.R. Ministry of Communications were found to be of substandard quality, improperly installed, and in constant need of maintenance and repair.<sup>47</sup> Even the Soviet relay broadcasting system, the mighty arm of the state propaganda machine, suffers because of the substandard quality of circuits and the fact that during the past 30 years the industry has been manufacturing substandard loudspeakers.<sup>48</sup>

The same situation exists with respect to radio receivers, refrigerators, washing machines, vacuum cleaners, light bulbs, and other consumer goods.

It would be most difficult to find an American housewife using a flatiron without temperature control. Because of the very high cost of a thermostat, which almost equals the cost of an iron, the Soviet industry, bent on volume, turned out, in 1962, a total of 8.6 million units and only 3.1 million of these with temperature controls. Less than one-half of hotplates have temperature controls.<sup>49</sup>

#### MILITARY HARDWARE

Reported Soviet launchings of manned spaceships into orbit around the earth and their subsequent recovery meant to many observers in the free world that the Soviet Union made tremendous strides in industrial and military technology. In the face of these problems, how can the Soviet Union build spaceships that can go around the earth? The answer is simple. Soviet technological achievements embodied in their spaceships were attained through crash programs conducted at the expense of research and development that does not contribute either directly or indirectly to the military effort. The bill for these programs was footed by Ivan the Citizen who had to pay at least 7 percent of his monthly wages for a pair of shoddy shoes, a price exceeding five times the actual cost of production of these.

Evidence accumulated by the West on the quality of Soviet military hardware suggests that the slipshod practices and operations of industry also reaches into the realm of the military. Obviously the military have the choice of best equipment, material, and qualified technical personnel. Yet, when one looks over the whole gamut of Soviet weaponry and equipment, a picture emerges suggesting that even the military have their problems.

During the Cuban crisis in October 1962, there were six Soviet submarines operating in Cuban waters. One of the six was forced by mechanical troubles to surface and was observed to be taken in tow by a trawler back to the Soviet Union. Incidentally, Radio Moscow, commenting on the incident, said that there was nothing wrong with the submarine and the fact that she was constantly surfaced indicated that the submarine was measuring the current velocity of the Gulf Stream. Similar difficulties were allegedly experienced by Soviet submarines off the coast of Alaska and in the Norwegian Sea. Assuming that only the best equipped and most reliable submarines are

<sup>46</sup> *Izvestiya*, Dec. 9, 1961, p. 4.

<sup>47</sup> "For an Uninterrupted Work of Automatic Pay Phones," *Vestnik svyazi*, No. 5, 1963, insert.

<sup>48</sup> Shamshin, I. A., "On the Technical Base of Wire and Radio Service," *Vestnik svyazi*, No. 2, 1963, p. 5.

<sup>49</sup> *Izvestiya*, Nov. 15, 1963, p. 3.

assigned such faroff missions, these incidents seem to indicate that the entire Soviet submarine fleet of some 450 units must have some serious difficulties.<sup>50</sup>

The reliability of Soviet electronics is generally so low as to constitute a serious threat of the effectiveness of radio navigation equipment aboard their military and commercial aircraft.<sup>51</sup> Today practically all Soviet TU-104 and IL-18 airliners are being equipped with British-made navigation equipment.<sup>52</sup> It was reported that Czechoslovak military aircraft employ Western communication systems. Specifically, a Czech-produced Mig 15 that crashed in West Germany was equipped with West German electronic equipment. Mig 21 fighters supplied to India had deficiencies, particularly in electronics and armament. The shiny Ilyushin aircraft showered by the Soviets on the underdeveloped and undeveloped nations proved vulnerable to normal operating hazards and required frequent and expensive overhauls. These aircraft while in the Republic of Guinea were found to be ill adapted to cargo transport and highly inefficient, and on the top of it they were most of the time in Prague undergoing repairs.

As far back as 1962 some American press media commented on the very short service life of these planes, especially of the aircraft engines. It was stated that Soviet aircraft had to be completely overhauled after 300 hours of flying time while similar British aircraft had a flying time of 2,000 hours between major overhauls.<sup>53</sup> This critical appraisal was labeled by the Soviets as "slander," "reactionary invention," and "unadulterated fiction." Soviets asserted that their aircraft were as good as the British.<sup>54</sup> I wonder if the authors of this rebuttal would dare to apply the same label to Khrushchev's December 13, 1963, statement before the Communist Party's Central Committee that—

\* \* \* up until recently Soviet aviation industry has been manufacturing aircraft engines with a service life of 500 hours, while the British engines have a life of 2,200 to 2,500 hours \* \* \*.<sup>55</sup>

Soviet missiles are not 100-percent reliable and Khrushchev's statement to Western newsmen that "we do not have any failures" should be taken with a grain of salt. Incomplete information suggest that the Soviet missile program is beset with difficulties. Since there are no data on pad failures we must limit ourselves to the either full or partial failures of probes placed into orbits around the earth or into trajectories that would have taken them to outer space.<sup>56</sup>

<sup>50</sup> Hearings before a subcommittee of the Committee on Appropriations, House of Representatives, 88th Cong., 1st sess., "Department of Defense Appropriations for 1964: Pt. 5—Procurement," Washington, Government Printing Office, 1963, pp. 863-865.

<sup>51</sup> *Ekonomicheskaya gazeta*, Mar. 2, 1963, p. 7.

<sup>52</sup> *Flag-Review*, January 1963, p. 3.

<sup>53</sup> *Newsweek*, Feb. 26, 1962.

<sup>54</sup> *New Times*, April 1962, pp. 16-17 (Soviet publication in English).

<sup>55</sup> *Izvestiya*, Dec. 18, 1963, p. 3.

<sup>56</sup> *Air Force Space Digest*, April 1963, pp. 121-123.

Date of launch	Designation	Comment
May 15, 1960-----	Sputnik 4-----	Placed "dummy" spaceman in orbit but failed to recover.
Oct. 10, 1960-----	Mars probe-----	Failed.
Oct. 14, 1960-----	do-----	Do.
Feb. 12, 1961-----	Venus probe-----	Missed Venus; probe in 300-day solar orbit.
Aug. 25, 1962-----	do-----	Launch from orbit believed to have failed.
Sept. 1, 1962-----	do-----	Launch from orbit; apparently failed.
Oct. 24, 1962-----	Mars probe-----	Exploded.
Nov. 1, 1962-----	do-----	Communication failure after 2 weeks. The Soviets assert that they lost contact with the probe sometime after March 21, 1963.
Apr. 2, 1963-----	Lunik 4-----	Presumably intended to soft land an instrument package on the moon. Missed the moon by more than 5,000 miles.

#### ECONOMICS OF UNRELIABILITY

One of the most important causes for the short service life of machinery and equipment appears to be the absence of concretely formulated and documented quantitative requirements for newly planned models. The second important cause is that service life and reliability of manufactured equipment by a given plant are not considered among the factors which are used to judge the performance of a given industrial establishment. Finally, the third cause is the lack of channels of communications between the producer and the user of the equipment. This factor is commonly referred to by U.S. manufacturers as the "feedback."<sup>57</sup>

Soviet industrial establishments are not too interested in increasing the quality, reliability, and service life of both producer and consumer goods since this would require additional material and labor expenditures. It would also require the acquisition of extra equipment such as measuring and testing instruments, the use of more expensive materials, and it would necessitate an improvement of existing designs. Should all these measures be implemented, the cost of goods would significantly increase and this is not what Soviet manufacturers are seeking. This attitude is also reflected in plants of various planning agencies which are basically interested in low cost, high volume output. The following specific case illustrates this general attitude. Several years ago measures to increase the service life of a crankshaft and main bearing by 50 percent were suggested to directors of the Gor'kiy automobile plant.<sup>58</sup> Since these called for additional equipment, better metal, and greater labor input, they were not accepted. In contrast, whenever there was a demand for stepped-up volume of output of any product, money, materials, and labor were always provided for. Representative sampling in a number of heavy industry plants revealed that extra awards for quantity amounted to 8 to 11 percent of the total wages and the awards for quality to 0.1 to 1 percent. The latter's share in pay of direct labor was even less.<sup>59</sup>

<sup>57</sup> Dem'yanovich, A. N. "Technical \* \* \*," op. cit., p. 5.

<sup>58</sup> Kapitanov, B., "On Increasing the Quality of Means of Production," Voprosy ekonomiki, No. 10, 1963, pp. 39-40.

<sup>59</sup> Meyerson, D., "Material Stimulus for Workers for Qualitative Indexes," Voprosy ekonomiki, No. 5, 1963, p. 42.

#### THE GAP BETWEEN THEORY AND PRACTICE

It is generally accepted that, in some areas of theoretical knowledge, the Soviets have made notable contributions. How does this explain the failure in the area of experiment and practice? One may find a partial answer in the explanation given by P. L. Kapitsa, an internationally known physicist, one of the key men in the development of Soviet nuclear weaponry. Kapitsa makes clear that today, in the Soviet Union, there is an imbalance in the development of theoretical and experimental studies--too many theoreticians and not enough laboratory technicians and engineers. The young college graduate aspires toward theoretical but not toward experimental work. He attributes this attitude to the "glory" surrounding the theoretician in his ivory tower and the lack of adequate personnel and facilities to verify his theories. According to Kapitsa, the theoretical work of 1 man should be supported by laboratory work of at least 25 to 30 people. Today the Soviets have only one laboratory man for each theoretician. A further hindrance to experimental work is the lack of proper laboratory equipment which, in some degree, makes experimental work less attractive to the scientist.<sup>60</sup>

#### CONCLUSIONS

Some quarters challenge the idea that the Soviet Union's technology is inferior to that of the United States by citing the extraordinary success of the Soviet in photographing the other side of the moon. This is a dangerous argument. First, it is an argument stemming from ignorance of facts. It is simply not true that the Soviets have attained a superior plateau in all aspects of engineering. It is true that they have managed certain apparently spectacular successes in the field of space technology. The advantage of a strict system of central planning is that it permits the concentration of all effort on specially selected projects, the choice of which is often guided by political expediency and the exigencies of international relations. It is comparatively easy in the Soviet system to achieve genuine successes for the purposes of propaganda. But propaganda successes do not reveal the Soviet shortcomings and grave deficiencies in the area of advanced equipment for the chemical industry, in the area of electronics, consumer goods, etc. The latest data gathered from unclassified Soviet trade journals and cited in this article indicate the existence of serious shortcomings in the production of machinery and the inability to cope with persistent failures. Chronic imperfections are due to the nature of the plan which can set up only a finite system of criteria for the acceptability of a given piece of goods. In the absence of a competitive system of selection of more perfect goods, the Soviets have to rely on the trial-and-error method of establishing production targets in terms of size, weight, or shape of goods. A strict system of central planning where every smallest detail of the economy is determined by a planning authority can never achieve that rapid selectivity and product improvement that typifies the free and competitive system of enterprise.

Judging from pronouncements of Soviet high officials, party notables, and economists, there seems to be a movement afoot to amend the

<sup>60</sup> *Ekonomicheskaya gazeta*, Mar. 25, 1962, p. 10.

rigid Soviet system, in order to make room for certain capitalist techniques and principles. Khrushchev pointed out in November 1962 that the Western system of efficiency through competition is a principle that ought to be adopted by the Socialist countries as well. Or as Khrushchev phrased it: "Why don't we then utilize that which the capitalists have—that which is rational and economically advantageous?" Recent debates in the U.S.S.R. on profit and incentives have resulted in the pronouncement that certain aspects of the capitalist profit motive are also acceptable in the Soviet Union. It is evident from recent developments in the U.S.S.R. that even the Soviets themselves are aware of the fact that the very nature of the Soviet economic system, as it now stands, prevents the development of an efficient industry capable of turning out dependable products.

Similarly, the agricultural problems confronting the Soviet Union today and the dismal failure of the chemical industry are the result of misplanning and mismanagement. Those who believe that the Soviet Union, if it makes the effort, can cure its agricultural ills, should realize that fertilizer is but a single factor; the overall capitalization required to improve agriculture is much more important. Soviet trucks and tractors, harvesters, and other agricultural implements, for example, are idle most of the time because of shoddy manufacturing practices.

The key to the whole farm problem is the Soviet farmworker himself. He is grossly underpaid and he is compelled to work long hours on either the collective or the state farm. Yet you find him at night working his own plot of land, which, although small, is still sufficiently large to provide him with excess produce which he is allowed to dispose of on local and city markets. Let's not underestimate his importance: his "overtime" is providing the Soviet Union with over 50 percent of dairy goods, poultry, fruits, and vegetables, although his holdings are extremely small.

Khrushchev's farm problems could be considerably improved by changing landownership practices. Since Khrushchev himself, speaking on the ills plaguing the Soviet industry, suggested certain capitalist principles, it would seem also rational to apply this approach to Soviet farming. Since this violates Communist doctrine, however, it is not likely to be introduced. Such course is possible but highly improbable because Khrushchev would not likely be willing to turn the gravediggers' spade, "defective" as it is, and prepare himself and the political system that exists in the Soviet Union for burial.

An alternate course most likely is that the Soviet Union will try to acquire from the West the equipment and goods it cannot produce. One is struck by the perfect correlation between the types of Soviet purchases abroad and those areas of production in the Soviet Union, which, by the Soviets' own admission, suffer from backwardness and poor quality. In other words, the Soviets are getting precisely what they need for their plan of "overtaking the United States" whereas the West gets only what the Soviets have to offer in the way of exports—namely, caviar, crabmeat, furs, and promises of peaceful coexistence.

Lenin stated in his "Report on Concessions" delivered on December 21, 1920, that " \* \* \* It is necessary to bribe capitalism with extra profit. Capitalism will get the extra profit—God with it [begone], with this extra profit, and we will get the basics [equipment] with the aid of which we will strengthen ourselves, will finally get up on our feet and defeat it [capitalism] economically."

Approximately 43 years later, N. Khrushchev, appearing before the December 9, 1963, session of the Central Committee of the Communist Party of the U.S.S.R., made an admission that the Soviet Union still needs Western-made equipment. This admission, after 43 years of toil and sweat and tremendous sacrifices on the part of the Soviet Union, is a confession that the Soviet politico-economic system does not work. Driving for a bargain—Mikoyan fashion at that—Premier Khrushchev departed somewhat from the premise laid out by Lenin. He said that " \* \* \* Bitterly disappointed will be those who expect to make fabulous profits (Lenin spoke of "extra" profit), using a seemingly advantageous situation, who expect the Soviet Union will be compelled to accept any agreement because it supposedly has no other way out \* \* \* ." He said further that Soviet orders would go only to those (in the West) who " \* \* \* are willing to earn an honest living \* \* \* " conditional on granting credits.

In the light of Khrushchev's repeated threats to "bury" the West, the Western nations, if they impose no political conditions on the expansion of East-West trade, may well be providing Khrushchev with the economic means to accomplish this "burial."



## THE SOVIET INDUSTRIAL CRISIS—II

### QUALITY CONTROL AND RELIABILITY IN THE U.S.S.R.<sup>1</sup>

By Joseph A. Gwyer<sup>1a</sup>

#### INTRODUCTION

During the past several years the attention of U.S. scientists and engineers has been focused on the reported accomplishments, both presumed and real, of the Soviet technological community. Reports that the Soviet Union has a greater rate of industrial growth than the United States, and that at this time it has been either rapidly closing the gap in terms of absolute figures in such areas as the production of steel and oil or has exceeded us in the production of coal and iron ore, have created quite an uproar and in some instances an unwarranted fear of an impending economic defeat.

The deductions I will attempt to make stem basically from the knowledge I have attained of the current state of the art of various Soviet technologies from an almost daily review of Soviet scientific and technical literature available in this country. Certainly, the most obvious method of appraising the achievements of a technological society is by evaluating its product, that is the quality and reliability of the goods this technological society manufactures. Let me assure you at this point that the national anxiety, and to some extent the ensuing hysteria, is based on slim evidence, often contradictory and often made by quantitative evaluation of Soviet data, without detailed analysis of what goes into Soviet figures. Recently reported launchings of manned spaceships into orbit around the earth and their subsequent recovery are less attributable to the volume of industrial output than to the ability of a ruthless totalitarian system to allocate by decree its best brains and almost unlimited material resources to the solution of a problem which is given the highest priority by the leaders of the system. Frankly speaking, these Soviet "spectacular" technological achievements were attained through crash programs, conducted at the expense of research, and development that does not contribute either directly or indirectly to the military effort.

As far back as 1956 and again in 1958, when writing on the subject of Soviet quality control, it was my intention to give the reader a general insight into how the Soviets are coping with this problem and thus stimulate interest in a subject of far-reaching importance.

Judging from the response over the past 5 years, I cannot escape the conclusion that I have been only partially successful. My efforts have stimulated interest only in what I knew about the subject. It has not created an interest that would manifest itself by comprehensive reviews and analysis of Soviet technical literature on this subject by others. In short—there has been an inadequate discussion in this field.

<sup>1</sup> Reprinted from *Industrial Quality Control*, vol. X, No. 2, pp. 1-8, and revised to Dec. 28, 1963.  
<sup>1a</sup> Senior research specialist, Library of Congress.

It is generally thought that one of the greatest obstacles to entry into this field is the language barrier. I have also heard statements to the effect that " \* \* \* since the Soviet economy is still an economy of shortages and that quality control as exercised in the U.S.S.R. is applied solely in extremely limited areas, why bother?"

Personally I think that the language barrier is not unsurmountable and that the above reasons are unwise. It is true that in comparison with the Soviet record, our quality control achievements to date are excellent and appear fast on the way to becoming even greater, but this is not the time to become smug and complacent. The Soviet Union, during its initial stages of industrial growth, confronted with labor surpluses, placed heavy emphasis on quantitative growth in order to provide labor with the necessary tools of production with very little, if any, stress on quality. This emphasis, fostered by the politico-economical philosophy of the Soviets, prevails today, but it may not be the prevailing consideration when the demand for goods is more fully met. During the past 5 years the Soviets have devoted more and more studies to the analysis of production difficulties, especially to quality control methods and procedures. Such disclosures as the fact that 800,000 metal-cutting machine tools are currently used in repairing equipment,<sup>1</sup> that about 30 percent of all Soviet tractors, up to 60 percent of all automobiles, and up to 25 percent of construction machinery<sup>2</sup> are systematically idle because of substandard quality of parts and assemblies, have a disturbing effect on the manufacturer and the quality-control engineer in the plant. It has been estimated that more than 30 percent of all Soviet metal-cutting machine tools are in repair shops undergoing repairs<sup>3</sup> and that it would be possible to manufacture 150,000 standard lathes from the metal going into spare parts for these machine tools.<sup>4</sup> According to A. N. Dem'yanovich, currently the Deputy Director of the Committee on the Coordination of Scientific Research, the annual cost of repair and maintenance of metal-cutting machine tools amounts to 1 billion rubles,<sup>5</sup> a sum greater than that allotted for the production of new machine tools.<sup>6</sup> The amount of metal going annually into spare parts for existing tractors would be sufficient to manufacture 180,000 new tractors, and the amount of metal going into spare parts for automobiles during the 1959-65 period is estimated to be the equivalent of 3 million new cars.<sup>7</sup> As of April 1, 1962, the Soviet reported a metal-cutting machine tool inventory consisting of about 2.4 million units.<sup>8</sup> When one considers that of these about 800,000 units are undergoing repairs, and that about 800,000 units are used to machine spare parts in repair shops scattered throughout the Soviet Union, then the balance of

<sup>1</sup> Orlov, N., "Scientific Foundations of Specialization Should Be Seriously Developed," *Ekonomicheskaya gazeta*, Dec. 4, 1961, p. 12; also A. Kosygin, *Izvestiya*, Oct. 24, 1961, p. 6.

<sup>2</sup> "High Reliability and Long Service Life of Machinery and Instruments Is a Matter of Paramount Importance," *Mekhanizatsiya i avtomatizatsiya proizvodstva* (5) 1961, p. 61; also A. Berg, "Science on Reliability," *Ekonomicheskaya gazeta*, June 8, 1961, p. 3.

<sup>3</sup> Gayle, G., "We Are Saving Kopecks and Losing Thousands," *Ekonomicheskaya gazeta*, Dec. 19, 1962, p. 16.

<sup>4</sup> Sorin, Ya. M., and A. V. Lebedev, "Glavnoye merilo kachestva" "Principal Measure of Quality," Moscow, *Iz-vo "Znanije"*, 1962, p. 18.

<sup>5</sup> Dem'yanovich, A. N., "Technical Progress and Problems of Increased Reliability and Service Life of Machines," *Vestnik mashinostroyeniya* (1), January 1963, p. 6.

<sup>6</sup> Dem'yanovich, A. N., "Maintenance and Repair Are Needed," *Mashinostroitel'*, (3) March 1963, p. 46.

<sup>7</sup> Gostev, V., "An Increase in Product Quality Is the Paramount Objective," *Kommunist*, (16) November 1962, p. 89.

<sup>8</sup> Editorial, *Stanki i instrument* (12), December 1962, p. 1.

about 800,000 units used by Soviet manufacturing establishments is not too impressive.

This situation also poses a problem for the Kremlin planners mapping Soviet strategy to be used in economic competition with the West for the control of markets in undeveloped or underdeveloped areas of the world.

Judging from information coming from the Soviet Union, the Soviets are very unhappy with the quality of their own goods. Soviet industry employs more than one million inspectors.<sup>10</sup> Despite all possible efforts to limit the output of defectives, the losses directly attributable to the output of defectives are constantly rising.

How is the Soviet Union tackling the problem of defective output? What methods and measures are being used to stem the tide of substandard quality?

For the answers, we must go to the Soviets themselves, to their scientific and technical literature. From these sources I will attempt to sketch briefly (1) the history and present status of quality control, and (2) the extent of industrial applications of these methods.

#### HISTORICAL SURVEY

Up until 1946 the term "quality control" was applied only in the acceptance of finished products. The "control" consisted largely of inspection to determine whether finished products conformed to predetermined standards and to find the basic contributing causes of defectives when too large a number of such accrued. Under this narrow concept of "quality control," the then most widely used method of control was the technique of "final continuous rejection of defectives."<sup>11</sup>

Using the above technique, the quality of each manufactured item was evaluated solely on the basis of its suitability or unsuitability.

The inspector was not interested in the dimension within the tolerance zone when the item was found to be suitable, or in the deviation from the tolerance limits when the item was defective. This tendency to evaluate the quality of each manufactured item resulted in the application of a "continuous" (sploshnoy) 100-percent inspection. Sampling inspection during the forties was considered by the Soviets as not fully adequate and was seldom used.

The reliance on external controls, consisting of detailed inspection of each outgoing product, did not eliminate the appearance of defectives in the hands of consumers. In order to step up the effectiveness of inspection methods, the Presidium of the Supreme Soviet of the U.S.S.R. issued on June 10, 1940, a decree fixing the " \* \* \* responsibility for the output of defective or unfinished products and for nonobservance of required standards by industrial establishments."

This decree, issued on the eve of the German-Russian war, stipulated that the " \* \* \* output of defective or unfinished industrial goods and output of goods not conforming to obligatory standards is considered as an antistate crime equivalent to sabotage."

The period following World War II up to the early months of 1950 can be characterized as the period of experimentation with quality control techniques both on a theoretical and a practical basis. During

<sup>10</sup> Karandeyev, K., "Automatic Equipment and Control," *Izvestiya*, Aug. 31, 1961, p. 3.

<sup>11</sup> Braginskiy, L. I., "Operativnyy statisticheskiy kontrol' kachestva v mashinostroyenii (Operational Quality Control in Machine Manufacturing)" Mashgiz, Moscow, 1954, p. 7.

that period an attempt was made to give new meaning to the term "quality control." This new scope of meaning not only broadened the concept of quality control but also assigned to it managerial functions, thus making it a key factor in industry rather than the mere operational element of controlling the quality of finished products either by 100 percent or sampling inspection.

Some of the trends were briefly outlined by N. G. Bruevich in a lecture read before the March 1956 Conference on Basic Problems of Precision in Machine Building, organized by the Commission for Machine-Building Technology, Machine Building Institute, U.S.S.R. Academy of Sciences.<sup>12</sup>

According to Bruevich—

\*\*\* statistical studies of precision carried out (by Soviet scientists) prior to the outbreak of World War II dealt primarily with quantitative characteristics and frequency distribution of variables under various conditions of production. These studies amassed a great volume of material on the frequency distribution of variables; tables were prepared combining mathematical expectancy and frequency distribution of variables with tolerance zones through laws of distribution. During the past ten years studies were conducted to determine the changes in frequency distribution laws resulting from factors such as heating, dulling of cutting tools, replacement of cutting tools, rebuilding of machine tools, etc.

During the 1950-51 period of discussions on the subject of precision of machinery, a crisis arose on the subject of statistical studies of precision. This crisis was caused by the fact that during the discussion opinions were expressed against the theoretical probability study concept of production of defects; the latter was contrasted with an analytical study concept of production defects. Individuals voicing these opinions asserted furthermore that in the precision of mechanisms and technological processes there are no "chance" phenomena and no "chance" variations. Many (researchers) began to shun studies of "chance" phenomena in the technology of machine building. Not everybody understood the great informing role of statistics and the theory of probability.

The resulting sad state of affairs held back the statistical study of defects in the technology of machine building; the defects were not judged as by chance phenomena; some researchers remembered previously suggested term of "functionally unexplainable variables" and considered that these are not a usual thing; some stipulated that there was no adequate mathematical apparatus for studying these unexplainable variables. The functionally unexplainable variables appear to be random phenomena and there is a mathematical apparatus known as the theory of by chance processes \*\*\*.

Resolutions of the XIX Congress of the Communist Party dealing with the fifth five-year plan for the development of the U.S.S.R. economy (1951-55), indicate that great stress was placed on the necessity for increased quality of products manufactured by all branches of industry. The resolutions envisaged a plan that would "\*\*\* assure the fulfillment of requirements outlined by the state all-union standards; would provide the state with analysis of product quality and production processes in order to detect and correct the shortcomings; and would eliminate and control the appearance of defective products."<sup>13</sup>

However, it was recognized even then that strict technical controls alone did not guarantee proper control of production processes and did not always satisfy the needs created by modern mechanized establishments. The causes for the above were attributed to (1) absence of a well worked out methodology of control, (2) underestimation of the value of quality-control techniques in the production processes, and (3) inadequate mechanization of control processes.

<sup>12</sup> Bruevich, N. G., "Current Status and Prospects for the Development of Scientific Studies of Precision in Machine and Instrument Manufacturing," *Izvestiya Akademii nauk S.S.S.R. Otdeleniye tekhnicheskikh nauk* (6), 1956, pp. 161-162.

<sup>13</sup> Novikov, A. S., "Statisticheskiye metody kontrolya kachestva promyshlennoy produktii (Statistical Methods of Quality Control in Industrial Production)," *Ltd-vo "Znaniye," Moscow, 1953, pp. 5-6.*

The establishment in the latter part of 1950 of the State All-Union Conference on Statistical Methods of Control and Analysis of Product Quality at the Academy of Sciences of the U.S.S.R. appears to be a milestone in Soviet attempts to standardize and unify the scientific approach to this problem.<sup>14</sup> Since 1950, numerous meetings between the representatives of industry and scientists brought about a mutual understanding of the vexing problems of statistical methods in quality control. Significant in this respect was a release by A. N. Kolmogorov, the Chairman of the Committee on Standards, by the Academy of Sciences, made in April of 1957, revealing that Soviet industry was just about to adopt a standard for acceptance and statistical control. According to Komogorov, the task of coordinating a quality control project for a standard was assigned to M. I. Eydel'nant, senior associate of the Uzbek Academy of Science.<sup>15</sup> By the spring of 1957, the project was virtually completed and scheduled for review not later than the third quarter of 1957. The release stipulated that the standard was to establish sampling plans and procedures for acceptance inspection; that it was to contain definition of basic statistical concepts, terms, and pertinent principles; master tables for selection of appropriate sampling plans, tables for sampling plans to reduce the destructiveness of inspection, etc.

In December of 1958, during the jointly sponsored conference by the Committee on Machine Building Technology (Institute for Machine Studies at the U.S.S.R. Academy of Sciences) and the Inter-VTUZ (schools of higher learning) Seminar on Interchangeability, Precision and Technical Measurements, a discussion took place on the status and prospects for the development of a theory and practical applications of statistical methods of quality control in the Soviet machinery manufacturing establishments of Moscow, Leningrad, and Kiyev economic councils.<sup>16</sup> The conference heard papers presented by A. K. Kutay, I. D. Faynerman, V. V. Golovinskiy, and I. V. Dunin-Barkovskiy. Altogether, more than 80 scientists and engineers representing these councils participated.

The papers read at this conference and the subsequent discussions revealed serious deficiencies in the program of practical implementation of statistical quality control methods. These methods resulted in a reduction in the number of defects and simultaneously permitted an increase in the quality of products. But despite these positive results, the application of statistical quality-control methods during recent years was curtailed. One of the reasons was found to be the absence of "material interest" in statistical quality control among workers.

The preventive control practice in the form of a constant observation of parameters within lower and upper allowable limits required the plotting of observations on charts at each work station. These charts were often too complex. Instruments intended to mechanize preventive control did not correspond to requirements. As a result, the number of inspectors, instead of decreasing, continued to increase. The responsibility for quality was shifted away from the workers. Although the use of statistical control revealed a significant number of

<sup>14</sup> Novikov, A. S., "Primeneniye predupreditel'nogo statisticheskogo kontrolya kachestva produktov (Application of the Preventive Control of Product Quality)," Gosenergoizdat, Moscow, 1955, pp. 5-6.  
<sup>15</sup> Conference on the State All-Union Standard for Acceptance Inspection, Standartizatsiya (3), 1957, p. 88.  
<sup>16</sup> Yakushev, A. I., "For a Wider Application of S.Q.C. into Production," Standartizatsiya (2) 1959, pp. 15-17.

unstable and defective technological processes, a number of plants, instead of correcting these deficiencies and preventing the appearance of defectives, went so far as to sort out production, and often parts deviating from chart and engineering specifications were considered as acceptable. The conference members also concluded that preventive control in plants, in a majority of cases was not related to the analysis of engineering processes. Statistical analysis was not used in determining the precision and stability of operations of equipment, instruments, and tools.

The all-union state standard (referred to by Kolmogorov in 1957) had not been completed as of December 1958, the date of the conference. During the April 1957 conference it was also said that the industry will get standardized terminology and definitions and also a standard for statistical preventive control. Formulation of these standards has also been delayed.

Despite the great urgency, the above standard was not ready as of June 1960. The Conference of Statistical Quality Control Methods held under the auspices of the Moscow Institute of Economics and Statistics emphasized the fact that the absence of a state standard retards the application of statistical quality control methods in industry. Among its resolutions, the conference recommended that the Committee on Standards, Measures, and Measuring Instruments together with the Ministry of Higher Education (1) prepare standard rules for economically efficient acceptance sampling which would replace numerous, often contradictory methods, embodied in currently used standards, (2) establish standards for statistical methods of inspection and control of production processes, and (3) prepare a method for calculating errors and tolerances within dimension chains. The Ministry of Higher Education should intensify the training of personnel in theoretical and mathematical statistics by introducing in VTUZes a course of "Statistical Methods of Inspection and Control of Production." Other recommendations included the organization of seminars for industry workers and the creation at one of the higher institutes of learning of a scientific research center devoted to problems of statistical quality control. It is difficult to ascertain at this point the progress made with regard to the above outlined recommendations. One thing is certain, however, that today the Soviet Union does not have a state all-union standard. This has been pointed out by V. Gostev in his article in the November 1962 issue of *Kommunist*, p. 94.

#### EXTENT OF INDUSTRIAL APPLICATION OF QUALITY CONTROL

The responsibility for administering the quality program throughout the Soviet industry is assigned to the OTK (Technical Control Division). Among its functions are to constantly watch over the production processes; to see that products are manufactured in accordance with the engineering specifications; to detect and prevent defectives; and to insure the delivery of good quality products only. Goods manufactured in a plant cannot be shipped to "customers" without the OTK stamp of approval and a certificate attesting to the quality of the product.

As of 1953, quality control was used by several machine-manufacturing, metallurgical, petroleum-processing, leatherworking, and bear-

ing-manufacturing plants. Among these were the Frezer plant specializing in the production of cutting tools, the Kalibr plant manufacturing instruments, most of the bearing and aviation plants in the Soviet Union, the ZIL (Likhachev automobile plant) in Moscow and the Gor'kiy automobile plant (GAZ) in Gor'kiy.

Exact information on the extent of application of quality-control techniques within each of these plants is not available. Sketchy information published in the Soviet Union is often conflicting and misleading. Specifically, it was said that the ZIL plant introduced quality control in all of its manufacturing operations as far back as 1950. Information published in 1958 shows that as of September 1956, only 0.8 percent of mass-produced pieceparts manufactured by the plant was fully in-process inspected and only 4.8 percent partially inspected.<sup>17</sup> Similarly, the 1 GPZ (first state bearing plant) in Moscow has been heralded by the Soviets as the "first in the world" fully automated bearing plant employing quality control throughout all its manufacturing operations, when in reality, as one competent observer noted during a 1959 visit to this plant, there was a complete absence of quality control.

An inspection of product quality and of the observance of standards and engineering requirements conducted by the Committee on Standards, Measures, and Measuring Instruments (of the Council of Ministers of the U.S.S.R.) revealed that the poor quality of measuring instruments is the primary cause of defectives.<sup>18</sup>

The inspection covered Moscow's "Krasnyy proletariy" plant, producing model 1V62 lathes, the Dnepropetrovsk machine-tool plant, manufacturing model FSh-4 milling machines, the Moscow jig-borer plant, producing model 2V440 jig borers, the Moscow grinder plant manufacturing model 5831 gear grinders, and the Yegor'yevsk "Komsomolets" plant, specializing in the production of model 5327 gear-milling machines and model 5B150 gear shapers. Examination of these machine tools revealed deficiencies ranging from improper finish and poor alinement to a disregard of established engineering requirements. Inspection of the widely used type ShchTs calipers manufactured by the "Kalibr" plant revealed that these do not conform to GOST 166-51 requirements in regard to basic parameters, as well as in terms of design and operational features. Their poor quality is also attributed to the fact that while in use their inner and outer measuring edges wear out quickly and the scale wears off the bar and vernier. Because of the low quality of pyrometric millivoltmeters manufactured by the Yerevan instrument plant, 70 percent of the instruments reaching the users do not meet engineering requirements and in a number of cases require immediate repairs. Despite efforts to insure that measuring instruments are maintained in proper repair and are properly calibrated, many industrial enterprises maintain them in an unsatisfactory condition. Inspection of establishments under the jurisdiction of the Administration of Machine Building of the Saratov sovnarkhoz showed that 30 percent of gages and measuring instruments inspected were inaccurate, defective, or had not been calibrated recently. Machine-building establishments of the Stavropol' sovnarkhoz had 35 percent of their measuring instruments classified

<sup>17</sup> Levin, B. M., "Ekonomiya chernykh metallov v parodnom khozaystve S.S.S.R. (Economy of Ferrous Metals in U.S.S.R.'s National Economy)," Gospolitizdat, Moscow, 1968, p. 323.

<sup>18</sup> "Measuring Instruments and Their Quality," Standartizatsiya (7), 1962, pp. 11-13.

as unsuitable, those of the Azerbaydzhan sovnarkhoz more than 19 percent, of the Tula sovnarkhoz 23 percent, and of the Volgograd sovnarkhoz 21 percent. A similar situation exists in machine-building plants of the Kursk, Bryansk, Sverdlovsk, and Khabarovsk sovnarkhozy, as well as a number of others. Inspection revealed that 60 percent of the gages and measuring instruments used by the Kozel'sk engineering plant (Kaluga sovnarkhoz) were unsuitable for use as were 78 percent of those used by the Khabarovsk plant for automatic machine tools, more than 80 percent of those used by the Smolensk plant for roadbuilding machinery imeni Kalinin, etc.

A similar situation exists at the Kazan' plant which produces various types of pressure gages, etc. According to the data of the Committee on Standards, Measures, and Measuring Instruments of the Council of Ministers of the R.S.F.S.R., the quality of MT-60 manometers manufactured by "Teplokontrol'" is substandard.<sup>19</sup> An examination was made of a lot of 1,353 manometers ready for delivery. It consisted of detailed inspection of 44 units, verification of the accuracy of readings of 645 units, and external inspection of 1,333 units. The detailed inspection revealed 27 of the 44 units to be defective (18 failed the overload test, 6 failed the pressure cycling, and 3 gave unsteady readings). The accuracy check of readings showed that 63 out of 645 units failed to meet the engineering specifications. External inspection proved that 387 out of 1,333 units did not meet the established standard. An analysis of the contributing causes revealed, among other things, that 23 percent of the testing instruments used by the "Teplokontrol'" plant were defective and that new manometers had been patterned after defective laboratory prototypes.

A partial explanation for this situation may be found in an article by A. Sprishevskiy, director of All-Union Scientific Research and Design-Engineering Institute of the Bearing Industry, in *Ekonomicheskaya gazeta*, November 13, 1961, page 17.

In his article entitled "Prospects for the Development of the Bearing Industry," Sprishevskiy emphasized the point that machine tools for grinding-finishing operations should assure the precision of form and dimension of parts, should be highly productive, and fully automated. According to him, the majority of Soviet-manufactured grinders do not provide the necessary machining precision. Specifically:

\* \* \* new surface grinders model 3772B, manufactured by the Moscow plant for grinders, are less accurate than the Blanchard machine produced during the thirties. Centerless cylindrical grinders manufactured by the Vitebsk machine tool plant are unsuitable for the production of bearings. The most difficult situation exists in the area of internal grinders \* \* \* The fourth state bearing plant has been waiting for 3 years for automatic race grinders models LZ-40 and LZ-72 from the Leningrad Il'ich plant. Khar'kov machine tool builders have not manufactured for 4 years a single model 6S80 and 6S82 machine tool for machining high precision railroad bearings. Then they built a whole lot of these which, because of design deficiencies, still remain now as "dead load" in the first and second state bearing plants \* \* \* .

The examples on pages 28-32 are more the rule than the exception. The extent of the alarm caused by the existing situation in respect to wholesale production of substandard goods has been pretty well defined by V. Gostev, currently the Deputy Director of the OTK at the Likhachev automobile plant in Moscow. Gostev is not a

<sup>19</sup> Chinenov, M. M., "Kazan' Plant 'Teplokontrol'" Is Violating the State Standard," *Standartizatsiya* (4), 1962, pp. 61-62.



novice in the field of quality control. Some of his works published back in the forties brought even then into the open the pressing problem of substandard quality of products. He may be considered as one of the leading advocates of S.Q.C. for most of the industrial production phases. Writing for the November (No. 16) 1962 issue of *Kommunist* (a journal usually devoted to political and ideological issues), Gostev does not pull any punches. In very blunt language he points out what's wrong with the Soviet industry. Here are some of his statements:

Page 88: " \* \* \* Despite the achievements of Soviet science and technology the quality of some types of products is inferior to better world specimens. This is true, for example, in the following areas: rolled metal, cold-rolled sheet, abrasive tools, bearings, precision metal-cutting machine tools, etc. Specifically the service life of Swedish ball bearings is 2 and that of roller bearings 3.5 times longer than of those made in the Soviet Union. The lag in terms of product quality in 1958, according to calculations by specialists, costs (brought about losses to) the U.S.S.R. economy 150-200 billion rubles (old currency)—a sum greater than one-fourth of all the income of the state budget for that time. This shows how great is the economic significance of product quality to the national economy. Regrettably, only a few workers of planning organizations responsible for the determination of basic objectives throughout the industry are sufficiently familiar with this fact. It should be admitted at this point that in planning indexes for product quality, there is as yet no satisfactory system \* \* \*"

Page 89: " \* \* \* The sciences of precision and of reliability (pertinent to machines, instruments, equipment, and whole systems) received considerable attention in recent years. Both sciences recommend a number of active methods affecting the design, technology, and production. Such methods are already reflected in foreign standards (statistical method of analysis, inspection, and control of product quality). Regrettably the state agencies responsible for standardization up until now place emphasis on standardizing the production and not the methods of inspection. Without the standardization of scientific methods, standards cannot assume the role of active vehicles for transferring scientific achievements into production, thus retarding the technological and production progress.

Soviet requirements for product quality are established by state standards (GOST's) and in the absence of these by technical specifications (TU's) mutually agreed upon by manufacturers and customers. Naturally, with technological progress, these GOST's and TU's should have been systematically reviewed and updated. However, this review greatly lags and the introduction of reviewed standards encounters great difficulties. Coupled with an overly delayed review of standards and the latter's inferiority to better foreign standards this leads to considerable losses. For example, large losses (about 30 percent of all losses) may be attributed to coal (its greater ash content) and gasoline (its low octane rating.)

The lag of Soviet standards manifests itself in lower quality requirements for a number of raw materials and finished products. Because of the inadequate service life of a number of mass-produced automobile tires, bearings, leaf springs (auto), aluminum evaporators in home refrigerators, electric light bulbs, radio tubes, etc., the state has to expend extra materials and means for the manufacture of spare parts. For instance during the 7-year plan the automobile industry will put into spare parts enough metal to make 3 million new cars. Despite this effort, automobile repair shops still suffer from an acute lack of spare parts \* \* \*"

Page 89: " \* \* \* The importance of reliability of machines can be seen in the following figures: According to data from various economic areas (khozyaystv), because of defects (above those anticipated and for whose elimination a certain time expenditure has been set aside) 25 percent of automobiles, 15 percent of tractors, and 30 percent of electric motors remain idle. The usable life (khodimost') of tires manufactured by the Yaroslavl' tire plant is 19,200 to 24,000 miles, those from the Moscow tire plant 15,000 to 18,000 miles, and those made by the Kirov tire plant 4,800 to 6,000 miles! \* \* \*"

Page 90: " \* \* \* It is apparent that in setting up production plans it is necessary to take into consideration the increase in quality and service life of products. The attitude of using basically (and this is being currently done) only the production cost index without consideration of the necessary improvement in quality inevitably leads to a gradual worsening of the quality of products \* \* \*"

Page 93: " \* \* \* An objective inspection service independent of administration technical control is a necessity since it is easier for this (independent) service to evaluate critically the production, expose deficiencies, and initiate a continuous fight for quality. Elimination of such a beginning will weaken the struggle and will eventually terminate it altogether, as has happened in a number of cases where the OTK (Division of Technical Control) was abolished \* \* \*."

Page 94: " \* \* \* The statistical method of inspection and quality control has been introduced into the national standards of 12 countries. It should be pointed out that the Soviet Union uses this progressive method 'clearly inadequately' (yavno nedostatochno) and in our opinion (Gostev) principally because of an absence of a state standard. During the past 15 years this method has been used by three large enterprises (ZIL, GAZ, and 'Frezer') but even there not in the desired scope \* \* \*."

Page 95: " \* \* \* It is regrettable that we do not have an accounting on a state-wide scale of instances of premature failures of instruments, machines, and equipment. A number of establishments and scientific-technical organizations does not know the actual precision, reliability, service life, and resistance to wear of most important types of equipment manufactured by our industry \* \* \*."

The material cited above poses a question: Are the Soviets, in view of their expressed concern, doing anything about it?

The answer is not simple by any means. In my opinion the greatest obstacle preventing the elimination of these deficiencies is the Soviet economic system itself. It is becoming apparent that the Soviets themselves are beginning to realize that you cannot "inspect quality into a product—since quality has to be built into the product." Since the latter has been taken care of here in this country to some extent by competition, the Soviets are having second thoughts on their "no capitalistic competition" system. Significant in this respect is N. Khrushchev's report to the Central Committee of the Communist Party of the U.S.S.R. on November 19, 1962. This report, reprinted in Pravda, November 20, 1962, carries the following interesting references to Western efficiency through competition:

" \* \* \* If the Capitalists act in this way (efficiency through competition), then our planned socialist system can utilize its advantages more successfully for speeding up the technical progress of production, for increasing the output of production and improving its quality. Engineers, designers, technicians, and workers of each enterprise (industrial establishment) desire that their energy and creative search be directed toward the better, that they bring success for the common cause. However, the efforts of many people and teams are fragmented and clash with each other. This sharply diminishes their nationwide effect. Is this permissible, comrades, under the conditions of socialist production? Is this not the proof of our inability to utilize to the full all the advantages of the socialist system, including those in the sphere of scientific and technical progress? \* \* \* Only major shortcomings in the guidance of scientific and technical matters in the national economy can explain the facts of tardiness in the introduction of the achievements of science and technology \* \* \*." Why don't we then utilize that which the capitalists have \* \* \* that which is rational and economically advantageous? \* \* \*"

I have mentioned previously the establishment of OTK's in each plant. This "theoretically" valuable and objective initiative is not producing desired results because of faulty premises. The OTK inspector, whose salary is lower than that of the workers on the production line whose product he is inspecting, is subservient to the plant directorate. Both workers and directorate rely heavily on generous bonuses for overfulfillment of production quotas. A strict inspector living up to his obligations could not possibly OK such defective goods. A strict inspector would contribute to the nonfulfillment of quotas thus depriving workers and directorate of bonuses which

alone amount to almost as much as their regular wages. Consequently, the stamping of "OTK" on goods is nothing more than a formality.

For instance, an inspection of product quality at the Kazan' plant for dental drills revealed that 90 percent of the goods manufactured by this plant did not correspond to state standards (specifications) while the official plant report showed that 98 percent of the goods produced were in conformance to the standard.<sup>20</sup> This and other mass falsifications of production data prompted the issuance of a decree on May 24, 1961, by the Presidium of the Supreme Council of the U.S.S.R. which stipulates that " \* \* \* padding plan fulfillment figures and insertion of other false data is considered to be an antistate activity punishable by deprivation of freedom for a period of 3 years \* \* \*." Interesting enough, the journal *Vestnik statistiki* (Statistical Herald), an official organ of the Central Statistical Administration of the U.S.S.R., printed this decree across its cover page in the June 1961 issue.

Currently, all Soviet production plans are quantitative without regard to quality. The quotas are high, too high in many instances. As a rule manufacturing establishments meet and exceed the quotas, but the goods they turn out are of questionable quality. The above-listed infractions are penalized, but fines do not come from the pockets of workers or plant directors but from the plant fund (plant is owned and controlled by State).

The overemphasis on quantity was perhaps best summarized by O. Antonov, famous aircraft designer (the turboprop Ukraine) and Deputy to the U.S.S.R. Supreme Soviet, who wrote in *Izvestiya*, November 22, 1961, page 4:

Emphasis on quantity (gross) rather than quality prevents the State Planning Commission, economic councils, and manufacturing establishments from shifting to new and more progressive indexes \* \* \*.

Despite the fact that higher quality is highly profitable to the State, the plant, with the blessings of economic councils, drives for quantity. After all, quantity (gross) is still unfortunately one of the basic indexes of plan fulfillment and the plan is a matter of honor for the workers and management; moreover, the existing bonus system makes the collective as a rule materially interested in the same notorious gross \* \* \* think about the causes of many of our accidents described in the press, and you will see in many cases, through the veil of mutual accusations and reproaches, the same unhappy "indexes" as the primary cause. These indexes are pushing manufacturers toward the wrong sequences of work, toward unfinished work, and toward endless rebuildings \* \* \*.

Antonov's article created quite a stir among the readers of *Izvestiya*. His pointed remarks resulted in numerous letters containing comments and proposals on how to cope with the existing situation. Responding to these, Mr. Antonov published a second article on the same subject in the May 25, 1962, issue of the same paper. He restates the fact that Soviet production is of poor quality and that the goods have a very short service life. He also points out that much of Soviet production is technologically obsolete. The inefficiency and waste common throughout the industry, he writes, is caused by the lack of what the economists call "feedback," a factor provided under capitalism by market forces and competition.

<sup>20</sup> Rabinovich, P. M., "Statistics in the Struggle for Increased Product Quality," *Standartizatsiya* (2), 1967, p. 15.

#### CONCLUSIONS

From the preceding discussion, I conclude that the Soviet quality control program is bogged down in a maze of conflicting interests. The theoretical thought is there, evidenced in the works of Kolmogorov, Khinchin, Siforov, and Gnedenko who are carrying on the mathematical tradition of Chebyshev, Lyapunov, and Markov of the last century. The difficulties of translating the theory into practice stem basically from organizational problems, lack of trained personnel, obsolescence of manufacturing equipment, and above all the reluctance of the state to substitute quality for quantity as the prevailing consideration in mapping its expansion goals.

N. Khrushchev, speaking on January 16, 1963, before the East German Communist Party Congress said: "\* \* \* We don't want a Kingdom in Heaven, we want an empire on earth \* \* \*." Right here Mr. Khrushchev discloses a *want* which is still out of his reach. The road to this "empire" is long and arduous judging from data reaching us through Soviet scientific and technical literature. It may be shortened somewhat if Mr. Khrushchev implements his exhortations of November 19, 1962, on the merits of "capitalist efficiency through competition."

After all, Mr. Khrushchev finds that what is good for General Motors, Ford, and Chrysler ought to be good for the Soviet Union. Pronouncements of this sort, if followed by some concrete action, may bring some profound changes in the social, political, and economic structure of the Soviet Union. It is quite possible, should this be the case, that the Soviet housewife will eventually see the day when the vacuum cleaner sufficiently reliable to replace the broom, and the washing machine capable of replacing the wooden washboard, will become an integral part of her household.

#### References

Some of the material included in the text has been published previously by the author in the following:

- (1) "Statistical Method and the Quality Problem in the Soviet Union," *Industrial Quality Control*, (8) 1958, pp. 9-13.
- (2) "Statistical Quality Control in the Soviet Union," *Proceedings of the 4th Annual Statistical Engineering Symposium*, May 7-8, 1958, U.S. Army Chemical Corps, Engineering Command, Army Chemical Center, Md., pp. 43-73.
- (3) "Quality Control and Reliability in the U.S.S.R.," *Proceedings of 1962 Middle Atlantic Conference of the American Society for Quality Control*, Washington, D.C., March 8-9, 1962, pp. 121-135.

The following excerpts from Soviet literature show that despite all the efforts of various governmental commissions, plants and almost entire industries are continuing to produce defective goods:

Moscow Carburetor Plant has installed 70 single and multispindle automatic lathes. These units manufactured by the Kiyev Plant for Automatic Machine Tools, Khar'kov Metal Cutting Machine Tool Plant, Yerevan Milling Machine Tool Plant, Ryazan' Machine Tool Plant, and others were delivered without automatic loading devices, cycle counters, inspection devices, etc. Their range

of machining operations is also limited. As a final result, the work coming off these automatic units has to be finished on 120 other machine tools.

Source: Ekonomicheskaya gazeta, December 18, 1961, page 10.

\* \* \*

Comments by A. Vysotskiy, Deputy Chief of the Minsk Bearing Plant, on the quality, design, and efficiency of some Soviet machine tools. Special purpose machine tools manufactured by the Khar'kov Metal Cutting Machine Tool Plant are bulky and extremely difficult to operate. Model 6S81 grinder considered as most modern differs little from its predecessor. Model MR-15 semiautomatic lathe manufactured by the Yeysk Machine Tool Plant is poorly designed and unreliable. Internal grinders produced by the Saratov Machine Tool are bad, still use manual clamping devices. Centerless grinders manufactured by the Vitebsk Machine Tool Plant are built around old and poorly designed Model 3184 grinders.

Source: Ekonomicheskaya gazeta, December 4, 1961, page 34.

\* \* \*

A. Vyatkin, Chairman of the Committee on Standards, Measures, and Measuring Instruments, with the Council of Ministers of the U.S.S.R., stated that the Soviet industry specializing in production of standard tools, jigs, fixtures, and other engineering accessories currently produces one half of the amount of standard cutting tools required by the industry and practically no special tools and other engineering equipment such as attachments, dies for forging and molding, and accessories. Production of these is scattered through numerous tool shops attached to most machine manufacturing plants which manufacture them using obsolete equipment and techniques at a cost two to three times higher than it would take to manufacture the same in a specialized plant.

Source: Standartizatsiya (8) 1960, page 5.

\* \* \*

Horizontal borers mod. 2656 and 2620A manufactured in 1958 and 1959 by the Sverdlov Plant in Leningrad had defective electrical systems. Grinders manufactured in Khar'kov are hazardous to operate. . . . The 6N82 milling machine manufactured in Gor'kiy has been shipped to "customer" plants without tools.

Source: Promyshlenno-ekonomicheskaya gazeta, August 19, 1959, page 2.

\* \* \*

Component parts for tractors manufactured by "subcontractors" for Khar'kov, Minsk, and Chelyabinsk tractor plants are of substandard quality. A. Izotov, Chief Specialist of the State Committee on Automation in Machine Manufacturing of the Council of Ministers of U.S.S.R., states that batteries, spark plugs, generators, thin-walled tubing, spring wire, and tires supplied to these plants are of poor quality.

Source: Ekonomicheskaya gazeta, December 8, 1960, page 2.

\* \* \*

In April 1961 representatives of the "Soyuzsel 'khoztekhnika'" (An Acceptance Commission) were forced to classify as defective 800 sewing machines Model SUB-488, more than 30 percent of potato diggers Model KGN-2M, and all potato planters Model SN-4B manufactured by the Belinskaya Plant for Agricultural Machinery (Penza Economic Council). In the same month, the Commission classified as defective 32 percent of flax combines Model LK-5 manufactured by the Bezhet'sk Plant for Agricultural Machinery (Kalinin Economic Council). The quality of fueling components for diesel tractors is unsatisfactory. Almost one-half of all jets manufactured by the Khar'kov Tractor Plant have to be rejected . . . and Khar'kov people manufacture millions of jets!

Source: Editorial, Ekonomicheskaya gazeta, May 21, 1961, 1.

\* \* \*

Up to 40 percent of the output of the Khartsyz'sk Pipe Plant, Zhdanov "Tyazhmash", Chasov-Yar Refractory's Plant "Krasnyy Oktyabr", Konstantinovka Plant, Yasinovataya Plant, and Slavyansk Fittings and Insulator Plants im. Artem (all plants in the Stalino Economic Council) was found to be defective by "flying inspection groups." Defects were as follows: Poor welds, sloppy assembly, parts not fitting together, control equipment inaccurate, etc. These defective items were stamped "OK" by the OTK.

Source: Standartizatsiya (9) 1960, pages 51-52.

\* \* \*

Fifty percent of the pressure gages manufactured by the Tomsk Plant, fifty percent of the gages manufactured by the "Manometer" Plant in Moscow, and sixty percent of the gages manufactured by the "Teplokontrol" Plant in Kazan', though stamped as acceptable by the OTK, were found unsuitable for industrial use. Sixty-five percent of the equipment manufactured by the Khar'kov Plant for Control and Measuring Devices, Riga Plant "Avtoelektropribor", and "Tizpribor" was found to be defective and the remaining 35 percent failed in test simulating a life of 6 months, although specifications called for a life of 3-4 years.

Source: Izmeritel'naya tekhnika (7) 1960, page 8-12.

\* \* \*

Khar'kov Diesel Plant manufactures defective diesels. In August 1960 Penza Diesel Plant which supplies valves, etc., sent to the Khar'kov Plant 180 indicator valves all of which were defective. The September 1960 shipment consisted of 108 valves of which 100 were defective. Tomsk Plant supplies defective tachometers.

Source: Ekonomicheskaya gazeta, October 2, 1960, page 3.

\* \* \*

Bulk of fittings supplied by Plants in Kar'kov, Dnepropetrovsk, Kirovets, Kiyev, Lugansk, Rzhisevsk, Verkhnaya Khortitsa are defective.

Source: Ekonomicheskaya gazeta, October 28, 1960, page 3.

\* \* \*

The development of the synthetic fibers industry to a large extent depends on the precision, sensitivity, and selectivity of chemical-analysis methods used by various plants. Prof. A. B. Pakshver, in his review paper presented before the All-Union Conference of Chemical Analysts on modern methods of control, held Nov. 17-19, 1959, in Moscow, under the auspices of the All-Union Chemical Society im. D. I. Mendeleev, indicated that most of the analytical methods used in plants are obsolete (length of time necessary to complete analysis not keeping up with the production cycle, inadequate accuracy of data obtained, etc., and pointed out that new analytical methods such as potentiometry, polarography, spectrophotometry, ion exchange, etc., should be used in the production control of synthetic fibers. He also stated that chief causes retarding the introduction of these new control methods into plant laboratory practices are the absence of simple and reliable instruments, spare parts for the latter, and also the absence among laboratory personnel of instrumentation specialists.

Source: Zhurnal vsesoyuznogo khimicheskogo obshchestva imeni D. I. Mendeleeva (2) 1960, pages 226-228.

\* \* \*

The problem of increasing the reliability of radio equipment manufactured by the radio and electronic industry was the chief topic of a scientific and technical Conference held in Moscow, which was attended by more than 1,200 scientific and engineering-technical workers of planning, designing, and industrial organizations. The Conference noted the deficiencies in the activity of scientific-research, design, planning, and industrial organizations, which are tardy in solving the problems of increased reliability of radio tubes, relays, condensers, and other radio elements. Among recommended measures to increase the reliability, the Conference suggested specialization of industrial establishments and introduction of modern testing equipment which would facilitate a more exact inspection of elements and improve their development.

Source: Vestnik svyazi (8) 1960, page 11.

\* \* \*

The Soviet Union has currently installed 40 million electric meters and manufactures about 4 million units annually. About 25 percent of all counters are constantly in repair shops.

Source: Ekonomicheskaya gazeta, February 19, 1962, page 15.

\* \* \*

The annual outlays for spare parts and maintenance of scraper-conveyors (coal mining) amount to the cost of the equipment proper and the annual expenditures on maintenance of basic coal mine equipment amount to 50 percent of its original value. The Soviet Union spends annually more than 200 million rubles on the maintenance of single-scoop excavators while only 180 million rubles on production of new units. Outlays for repair of universal metal-cutting machine tools during their useful life exceeds 6-8 times their original value. On the average about 20

percent of all electric motors are constantly in repair shops. The percentage for small electric motors is considerably higher.

Source: Mekhanizatsiya i avtomatizatsiya proizvodstva (12) 1961, page 41.

\* \* \*

A. Kosygin, Deputy Chairman of the Council of Ministers of the U.S.S.R., well known for his frankness and concern for Soviet industrial development, said: "Some 800,000 metal cutting machine tools are scattered through repair shops of various industrial establishments. These machine tools are being used to make spare parts and components. In most cases these components are made on an individual basis without observance of engineering requirements and at too high a cost." " \* \* \* Our diesels and (internal combustion) engines will have too short a life, and therefore we have to manufacture excessive numbers of them in order to meet the needs of the economy. Increasing the service life of these must be made one of the major economic tasks \* \* \* " " \* \* \* It is quite intolerable that defective machinery and equipment should sometimes be delivered to construction sites. We must seriously reproach the management of such large and modern plants as the Podol'sk Machine Manufacturing Plant (Moscow Oblast Economic Council), the Elektrosila Plant, and the Khar'kov Turbogenerator Plant. Because of defects in power equipment delivered by these plants, the 150,000 and 200,000 kw generators have not gone into service at the Southern Urals Power Plant and the Nazarovo Power Plant. Defects were also found in equipment shipped to the Dneper State Regional Power Plant."

Source: Izvestiya, October 24, 1961, page 5.

\* \* \*

A. Topchiyev, Vice Chairman of the State Committee on Automation and Mechanization of the Council of Ministers of U.S.S.R. (1961), stated that: " \* \* \* Despite measures, etc., defective equipment is still being sent to 'customers.' Two years ago, the Neva Machine Manufacturing Plant built 36 compressors with gas-turbine drives. Thirty-three were shipped to pumping stations along the Stavropol'-Moscow gas line. Before these could be used, they had to be refinished and some even returned to the plant of origin for rework \* \* \* Not a single unit was tested prior to shipment \* \* \* "

Source: Ekonomicheskaya gazeta, January 19, 1961, page 2.

\* \* \*

K. Karadeyev, Corresponding Member of the U.S.S.R. Academy of Sciences, Director of the Institute for Automation and Electronic Measurements of the Siberian Department described the problems facing Soviet industry as follows: " \* \* \* The problem of overall automation is of greatest importance to the State. The success of economic competition with capitalist countries depends on our proper solution of this problem \* \* \* Mathematical methods are fairly well developed \* \* \* but the situation in experimental engineering—the tool for obtaining qualitative data is considerably worse. We very often encounter an inattentive attitude toward quantitative experiments, toward the measurement of technology proper. This can be explained sometimes by lack of understanding but most of the time by the absence of necessary equipment and instruments. The unsatisfactory performance of the instrument-manufacturing industry holds back the science on a "starvation diet" (na glodonom payke), thus hindering its further progress \* \* \* In the U.S.S.R. machine manufacturing industry there are 1 million people engaged in inspection alone! Despite its size, this army of inspectors does not assure necessary product quality because existing sampling methods of inspection permit the filtering through of defectives \* \* \* Only automatic equipment can sort and inspect 100 percent of product, but this equipment is still to be had \* \* \* "

Source: Izvestiya, August 31, 1961, page 3.

\* \* \*

" \* \* \* Unit machine tools and transfer machines manufactured by the Minsk Plant for Automatic Lines often break down, and some, because of design deficiencies, do not function at all. E.g., because of design deficiencies, the transfer machine LM-119 for machining front tractor axles is idle at the Minsk Tractor Plant \* \* \* "

Source: Ekonomicheskaya gazeta, Feb. 5, 1962, page 21.

\* \* \*

N. Psurtsev, U.S.S.R. Minister of Communication, speaking at a session of the Council of the Union of the U.S.S.R. Supreme Soviet, said that 60 percent of the TV sets sold in the U.S.S.R. in 1961 failed to work during the "guaranteed" period of six months. He also said that the number-dialing mechanisms of telephones manufactured by Latvian and Permian economic councils have an expected life of 55 hours of continuous dialing instead of a normal life expectancy of 500 hours.

Source: Izvestiya, Dec. 9, 1961, page 4.

\* \* \*

The State Committee on Automation in Machine Manufacturing reviewed the problem of quality of metal cutting machine tools and transfer machines delivered by the industry to the Likhachev Plant (ZIL) and the First State Bearing Plant (I-GPZ) in Moscow, and to the "Serp i molot" Plant in Khar'kov. The Committee found that in a number of instances, the above named plants received equipment which did not satisfy the increased performance requirements in terms of precision, productivity, reliability, service life, and quality of manufacture. An inspection by the Committee covered the following plants:

Ryazan' Machine Tool Manufacturing Plant.

Moscow's.—

"Stankoliniya" Plant "Krasnyy Proletariy" Plant

"Ordzhonikidze" Plant

Leningrad im. Il'ich Plant

Khar'kov Machine Tool Manufacturing Plant.

Among basic design deficiencies of metalcutting machine tools and transfer machines delivered to "Serp i molot," ZIL, and I-GPZ plants are the following: inadequate precision of machining of racegrinding, internal-grinding, rim grinding, and other machine tools intended for the bearing industry (manufacturer—Leningrad M. T. Mfg. Plant in Il'ich); lower than planned productivity of transfer machines intended for the "Serp i molt" Plant manufacturer—Ryazan', Khar'kov, and Moscow's Ordzhonikidze M. T. Mfg. Plants; low functional reliability caused by breakage and subsequent breakdown of individual components and assemblies, some of it because of substandard manufacture and assembly; poor protection of sliding surfaces from chips, abrasive dust, and other foreign objects; leakage of lubricants from hydraulic assemblies and lubricating system; etc.

Source: Mekhanizatsiya i avtomatizatsiya proizvodstva (10) November 1962, page 57.

\* \* \*

All of the washing machines manufactured in August 1962 by the Chelyabinsk Washing Machine Plant were found to be defective and were returned to the plant for rework \* \* \*. Vladimir Tractor Plant manufacturing the Vladimirets-28 tractor turns out defective units. Operators claim that they spend more time under the tractor repairing it than behind the steering wheel. About 10 percent of the tractors coming off the conveyor assembly line go immediately for rework because of defective crankshafts, etc.

Source: Komsomol'skaya pravda, December 2, 1962, page 2.



## THE CRISIS IN THE SOVIET RAW MATERIALS BASE

### SUMMARY

Throughout the Soviet bloc (by which is meant here the Communist countries except for Albania, China, and its satellites in the Far East) there is a growing shortage of a number of important industrial minerals. This is attributable partly to bad planning in the past, geographic disadvantages, the diversion of Chinese minerals exports elsewhere, and wasteful Communist mining methods. Another cause is the fact that industrial production is rising more rapidly than the production of raw materials. Lacking sufficient gold and foreign exchange, economists in these countries are looking increasingly to obtaining cheap high-grade mineral supplies from the developing countries in exchange for technical assistance to these countries.

### THE SHORTAGE IN THE SOVIET UNION

While the attention of the world has been focused on shortages of Soviet grain, scarcities of vital industrial minerals threaten the momentum of Soviet industrial growth. The average grade of new mineral deposits discovered in the Soviet Union has dropped rapidly through the years, and most of them are being found in remote areas where development costs are very high. To cite one example: Even in 1956 the quantity of lead recovered from a ton of ore had declined to 28 percent of what had been obtained in 1932, according to the Soviet Bulletin of Non-Ferrous Metallurgy (No. 19/20, 1957, p. 53).

Speaking of underground polymetallic mines, Moscow's Gornyy Zhurnal (No. 4, April 1963) complained, "in the capitalist world richer deposits are mined than in our country. \* \* \* We cannot allow a ton of extracted polymetallic ore in the capitalist world to produce 90 to 250 kilograms of metal and bring in huge profits while our ore produces only 40 to 85 kilograms of metal and great losses." The article complained that nearly exhausted deposits were being worked while new ones were neglected for lack of capital or because of bad planning. The same periodical, in the same issue, reported that in mining "labor productivity tripled over 1947 for the ore mass, but increased only 45 percent for the metal extracted \* \* \*. The cost per ton of extracted ore dropped 34 percent, but the cost of the metal increased 55 percent" in polymetallic mines.

The periodical Razvedka i Okhrana Nedr, Leningrad (No. 5, May 1963, pp. 1 ff.) contained a warning by A. V. Sidorenko, Chairman of the State Geological Committee of the U.S.S.R.:

While many raw material deposits such as manganese, chromites, iron, diamonds, asbestos, and lead are as good as the ores mined in the rest of the world, some of the explored deposits are poor and the ore difficult to concentrate. Molybdenum ores mined in the U.S.S.R. contain less metal than U.S. ores. Until very recently, most of the nickel ores mined in the U.S.S.R. were inferior to ores mined in Canada and New Caledonia. The situation is similar with regard to mercury ores and raw materials for aluminum. Some 20 percent of the ore in explored iron ore deposits require complicated and expensive methods of

concentration. Recently, there has been some decline in the average content of metal in lead, zinc, copper, molybdenum, and tungsten ores. This decline in average metal content is natural as industry is forced to use poorer ores due to limits to the availability of high grade ores.

The Soviet press contains frequent harangues to save metals wherever possible. Said *Sovietskaya Estoniya* on December 19, 1962: " \* \* \* In order to obtain 1 ton of tin, 300 tons of ore must be treated. \* \* \* In order to obtain 1 ton of nickel, 200 tons of ore must be processed. \* \* \* It is essential that our designers keep this in mind." The article contained numerous suggestions for substitutes. *Komsomolskaya Pravda* on November 25, 1962, complained: "Not only copper is scarce. Tin, nickel, lead—all these metals are extremely critical. \* \* \* There is in existence a list of products for which the use of non-ferrous metals is prohibited." *Promyshlennost' Armenii* (No. 4, April 1963) contained a similar article concerning a "scientific-technical seminar on the problems of the economical use of copper and other nonferrous metals at enterprises in the Armenian SSR." It is clear from these many reports that the quality of many Soviet manufactures is suffering due to the necessity of departing from the best engineering specifications in order to use smaller amounts of metals in short supply.

#### THE MINERALS SHORTAGE IN THE SATELLITES

The satellites of Eastern Europe are in a similar position. Obligated by Stalin to import low-grade ores from the Soviet Union, and still tied largely to the Soviet economy, they share the Soviet shortage. Occasional articles in the East European press echo Sidorenko's complaint. In the Bulgarian periodical *Naruchnik i Agitatora*, November 1962, for example, a mining engineer complained: "The metal content of newly discovered deposits will continue to diminish. It is expected that we will have to penetrate to deeper levels."

#### CAUSES OF THE SOVIET MINERAL SCARCITY

A Soviet mining enterprise is apparently unable to extract as much metal from a mineral deposit as can a mining firm in the West. The Soviet newspaper *Narodnoye Khozyaistvo Kazakhstana* (No. 2, February 1963) explains why:

Year after year the plan for the metal content of the ore produced exceeded the possibilities indicated by the geology. In order to fulfill an obviously exaggerated plan the rich ore was "robbed" every year, thus violating production schedules and proper techniques of developing the horizons. As a result, considerable quantities of lean ores remained in the blocks, these ores being lost to the national economy. \* \* \* Until the 20th or 25th of each month, the mill would receive ore with less than the planned metal content. Then the miners would launch an attack on the rich stopes, causing a sharp rise in the metal content of ore delivered and the fulfillment of the plan for the month. \* \* \* As a rule such fluctuations in the content of metal in the ore disorganizes production and causes losses of metal in waste rock.

The same periodical in November 1962 said:

For the Zyryanovsk deposit \* \* \* the lead assay of the ore to be mined and the corresponding figure for other metals were set by the state planning commission at 30 percent above the average geological assay \* \* \*. It is obvious that this policy of wasteful exploitation of mineral wealth and the chase after high-assay ores is shortsighted and will soon lead to deplorable results.

Other reasons for inefficient exploitation of natural resources peculiar to the Soviet-type economy may be gleaned from the Soviet press. Sidorenko complained in Izvestiya on May 10, 1963, that the natural desire of certain republics to attract large development appropriations to their area had led them to exaggerate the value of local mineral deposits. According to other reports, many of these had to be dropped after expensive reinvestigation. Vast sums were spent in developing some, however, before it became apparent that they were uneconomic. However, old and almost exhausted deposits are worked, because little new investment is needed for them, while development of richer new deposits often is postponed for lack of money. The inferior quality of much Soviet mining machinery has also been blamed in the Soviet press for delays and added costs in bringing deposits into production.

Unlike mining enterprises in the free economies, the Soviet mining industry suffers from being forced to plead for investment funds from planning officials with little understanding of geology or mining engineering who are under pressure from the party to favor current, politically important construction and manufacturing programs. The Communist eagerness for immediate results has caused a relative indifference toward mining projects which tie up vast sums of investment money and do not come into production for years. Sidorenko has repeatedly drawn attention to the handwriting on the wall. His tone indicates that he is becoming somewhat desperate. On July 28, 1962, in Ekonomicheskaya Gazeta he warned:

The present level of explored reserves of minerals was achieved primarily over a period of 30 to 35 years. \* \* \* We must now increase our reserves by 5 to 6 times within 10 to 15 years \* \* \*.

The search for deposits and the accumulation of reserves is becoming more and more complicated. The problem is that the deposits lying close to the surface have mostly already been opened up, and now we have to look for minerals sometimes beneath layers of rock kilometers thick. Thus, for example, the average exploration well for oil and gas must be increased from 2.1 to 3.5 kilometers, and in some areas 4 to 5 and even 7 kilometers.

In exploration for metals it will increase from 200 to 300 to 500 to 600 and even 1,000 and more meters. \* \* \* This will require a vast increase in investment, and not just five or six times as much, but much more.

On December 12, 1962, Sidorenko told the Supreme Soviet that mining depths would have to be doubled and even tripled, and that this could not be done within the current budget estimates. As if in reply to the party orators, who have boasted that the Soviet Union has the largest reserves of minerals in the world, Sidorenko said that he had dropped 4,000 mineral deposits from the list of "reserves" because they were too poor to mine.

#### NEW SOURCES OF SUPPLY ABROAD—ORE FOR "AID"

As the Soviet bloc plans ever larger increases in industrial production, the problem of raw materials becomes more acute. The shortage of rich deposits and the long delay in bringing into production deposits which, due to poor planning, were developed too late, mean that an increasing percentage of certain metals must be obtained either from extremely high-cost, wornout domestic mines or from imports. Since the Soviet bloc needs its limited supply of gold and foreign exchange to purchase food and industrial equipment which it cannot produce at home from the advanced industrial countries of the West, and since

it is able to sell few of its inferior manufactures for hard currency, under the guise of economic assistance it is attempting to barter inferior manufactures for high-grade raw materials from the former colonial countries. The temporary oversupply of some of these raw materials in these countries and their eagerness for industrial development make some receptive to such an approach.

In nearly every case the aid agreement negotiated between the Soviet bloc and developing countries has specified that the latter may pay for the aid in commodities produced by them. Ores, concentrates, and metals are playing an increasing role in the repayment to the Soviet bloc of aid loans, particularly in connection with mining enterprises constructed with Soviet bloc help. The test case of Cuba shows the advantages reaped by the bloc. In 1960 nickel was critically short. Soviet industrial periodicals contained such references as the following: "In order to reduce the consumption of critical nickel, the Kuybyshev steel casting plant started work in 1960 to select a steel with a lower nickel content than the indicated steel" (*Tyazhelaya Promyshlennost'*, Moscow, No. 7, 1962). The quality of alloys was suffering because of the nickel shortage. The nickel situation of the Soviet bloc was improved, however, when Cuba was added to the Soviet economic system. Prague's *Rude Pravo* reported on August 2, 1963:

In 1961 Cuba became the third largest trading partner of Czechoslovakia. The scope of trade is still increasing, and the exchange of goods has climbed today by 45 percent. Czechoslovakia mainly needs raw materials, while free Cuba values the comprehensive technical assistance for the industrialization of the country. Today Cuba ships mainly nickel, copper, as well as chromite and manganese ores to Czechoslovakia. The importation of Cuban ores and nonferrous metals comprises the largest category and amounts to two-fifths of total Czechoslovak imports from Cuba.

The Hungarian Communist organ *Nepszabadsag*, on October 6, 1963, said: "We must double our exports of machines and fine mechanical products within a few years \* \* \* in order to be able to import \* \* \* absolutely necessary raw materials."

Under other agreements, Soviet geologists are now prospecting for oil, iron, coal, gold, and beryl in Afghanistan; oil in Syria and Pakistan; and for various minerals in Mali, Guinea, Ghana, and Ethiopia. Soviet and Czechoslovak geologists are looking for almost any useful mineral in Indonesia. The Czechs also are "aiding" Morocco in the development of a copper mine and are attempting to persuade Bolivia to accept a tin smelter, to be repaid in tin concentrates. *Pravda*, on October 18, 1963, stated that the new agreement with Afghanistan signed on October 17, 1963, stipulated that the Soviet Union would aid in the development of natural gas deposits; production was to total 2 billion cubic meters of gas starting in late 1966, of which 1.5 billion were to be exported to the Soviet Union "with the possibility of increasing the deliveries."

#### *The copper famine*<sup>1</sup>

"We are paying gold to buy copper abroad," complained Premier Khrushchev at the plenum of the CPSU in 1959. Failure to install an acquiescent regime in the copper-rich Congo cost the Soviet Union vast sums for development in the Soviet Union and drained away

<sup>1</sup> "Imports of Copper by the Communist Countries from the West—1955 and 1958-62."

foreign exchange to buy the copper, mainly from Rhodesia and Chile. Although there are bright spots here and there, the Soviet press seems to contain more disappointments than successes with regard to copper. The newspaper *Kazakhstanskaya Pravda* on June 4, 1963, complained: "\* \* \* Our national needs for copper in connection with electrification considerably exceed the supply. \* \* \* The Irtysh and Glubochansk ores would already have been on their way to the beneficiating plants. Now the Sovnarkhoz has fallen behind schedules, large investments have been made, and the ore is not forthcoming, if it ever will be. The deadlines for launching the Glubochansk mine are already far behind us." *Pravda*, on May 25, 1963, complained of the lag in development of new deposits in the Dzhezkazgan mining district, where ore containing as little as 0.5 percent copper is mined, and of the low quality of new mining machinery.

Copper is scarce in the East European satellites as well. Typical was an article in the Bulgarian periodical *Naruchnik Na Agitatora*, November 1962, which gave Bulgarian copper ore reserves as 24 million tons containing more than 1 percent of copper, and 96 million tons containing less than 1 percent. A single medium-sized mine in Africa showed greater reserves of richer ore than all of Bulgaria. It is no wonder that the managers of the giant industrial enterprises of the Soviet Bloc cast covetous eyes at Africa.

The Czechoslovaks are developing a copper deposit in Morocco and prospecting for the metal in Indonesia.

#### *Aluminum*

This is not as bad a headache. Hungary has considerable high-quality bauxite, and exports some to the Soviet Union; but viewed as a whole, most of the aluminum supply of the Soviet bloc comes from higher cost syenite deposits in the Soviet Union. Soviet eagerness to establish control in Guinea, which possesses vast reserves of magnificent bauxite, alerted the Guinean Government, which expelled the Soviet Ambassador for subversion and is now vigilant against a repetition. Huge and developed deposits of bauxite also exist in British Guiana, which explains Communist interest there.

#### *Ferrous metals*

The new Norilsk nickel mine and the Cuban imports have relieved the Bloc nickel shortage, and the U.S.S.R. never lacked manganese in any case. The iron ore situation is not as bright. The Soviet Union has immense reserves of iron ore, but most are low in iron content, lie at depths making them expensive to mine, or are in remote areas far from industry, thus incurring great expense for transportation. In addition, some of them suffer from undesirable impurities, such as sulfur, which are difficult to remove. Soviet ore, until recent years, was exported in bulk to Eastern Europe, but the latter countries have increasingly striven to obtain the richer ores of the developing countries instead. The use of inferior ore is one of several reasons for inferior metal. One of the reasons for the heavy and clumsy design of so much Soviet bloc machinery is that the engineers must add more metal to compensate for weaknesses.

The low quality of some Soviet iron ore is having deleterious effects upon the quality of Soviet manufactures. N. N. Tarasov, Chief of Administration in the State Committee for Automation and Ma-

chine-Building of the Council of Ministers of the U.S.S.R. wrote in the magazine *Traktory i Sel'khoz mashiny*, No. 12, 1962:

For producing the more crucial engine parts—cylinder heads, piston rings, piston housings, cylinder blocks, and others—cast iron of type LK and class A with a maximum sulfur content of 0.02 percent is required. Yet metallurgical plants are consistently delivering cast iron of class V with a sulfur content of over 0.6 percent.

Said the Polish newspaper *Zycie Warszawy* (No. 57, Mar. 8, 1962):

In Poland everyone knows and abroad those who are interested know that our motorcycles are no sputniks on wheels \* \* \*. The use of poorer, and therefore weaker materials makes necessary the production of thick plates, tubes, bars, etc., which naturally leads to a weight advantage of foreign vehicles competing against Polish vehicles.

Mieczyslaw Mrozowski, president of the Central Bureau of Geology of Poland, admitted, in *Przeglad Techniczny* (Dec. 9, 1962), that "due to the fact that Polish iron ores are of low grade and the geological conditions of the deposits are not favorable, these reserves are not adequate to cover the requirements of Polish industry."

East European countries have, accordingly, raised their imports of rich foreign ore to almost 3 million tons last year. Rumania recently offered drilling equipment to Brazil to be paid in Brazilian iron ore, and Czechoslovakia even contracted to buy South African iron ore, despite the boycott of South African products imposed by other African countries, according to a recent announcement by a South African exporter.

#### *Tin and antimony*

China had been the traditional supplier of these metals within the Soviet bloc. When the Soviet difficulties with China became acute, Soviet consumption of tin was greater than domestic production, most of which, in any case, came from higher cost mines than those operated in the free world or China. Before 1960 Communist China sold most of its tin and antimony to the U.S.S.R. which reexported part of it elsewhere. Following the worsening of Sino-Soviet relations and the termination of Soviet aid to Communist China, the latter ceased to export these metals to the Soviet Union and began to sell them for hard currency in world markets, thus forcing the Russians to obtain tin and antimony for foreign exchange abroad, from expensive domestic mines, or from the developing countries.

Russian reexports of tin to the West halted in 1961, and on December 8, 1961, the *Mining Journal* of London reported an announcement that Indonesia would commence exporting tin to the Soviet Union. Between 500 and 2,000 tons were to be sold to the U.S.S.R. during 1962, said the Indonesians, and 1,000 tons to another East European country. Indonesia already supplies natural rubber to the Soviet bloc as part repayment for economic and military aid, and once again the question is raised: "Who is aiding whom?" The Russian extractions from Indonesia in ores and agricultural products in repayment of Indonesia's great "aid" debt to the U.S.S.R. are now almost as great as the profits formerly obtained from that country by the Dutch, who had a far greater investment. As Indonesian tin flowed to the Soviet Union, the need for uninterrupted output became urgent, and the Indonesian Government, late in 1961, declared the state-owned tin mines on the islands of Bangka and Belitung to be "vital enterprises," meaning that strikes are illegal. This was probably

a wise move, in view of the fact that many of the miners are citizens of Communist China.

The desire to obtain hard currency for some mineral exports remains strong, however, and Indonesia recently began again to ship tin to the smelter in Arnhem, Netherlands, which had formerly processed most of the Indonesian tin production.

Antimony, like tin, was exported by Communist China to the Soviet Union and Eastern Europe prior to 1961. In that year the Chinese took out full-page advertisements in London mining periodicals offering Chinese antimony for sale on world markets. Exports to the U.S.S.R. and Eastern Europe apparently ceased or slowed to a trickle. About this time the Czechoslovak Government approached Bolivia, which has extensive antimony deposits, with an offer to build antimony smelter for Bolivia. Last year a contract was signed, but continuing negotiations indicate that the agreement has not yet begun to be implemented. It is reported that the antimony smelter is to be paid for partly in exports of antimony to Czechoslovakia, which will presumably reexport it to other members of the Soviet bloc.

*Other Metals—Beryllium, lithium, niobium, columbium, uranium, etc.*

The Soviet Union possesses commercial deposits of all the rare metals which have assumed such importance in the modern rocketry, aircraft, and atomic energy. Uranium is relatively plentiful in Czechoslovakia and in various parts of the Soviet Union. Molybdenum has been short, but the shortage will be eased somewhat when the Agarak mine in Soviet Armenia is opened later this year.

#### PROBLEMS FOR THE DEVELOPING COUNTRIES

Superficially it would appear that inferior industrial equipment is better than none, and that if a developing country can dispose of surplus raw materials in return for equipment whose market value is unknown and whose price is set by the seller alone without competition, it has nevertheless made a gain of sorts.

A number of problems make the proposition less attractive when viewed in detail, however. First of all, the bloc is often willing to subsidize development of mineral deposits which are uneconomic when viewed from the standpoint of world prices. Such enterprises are thus dependent upon steady bloc purchases of the product. However, the Soviet bloc has proved an unreliable customer. Many countries which have signed trade agreements with it—Israel, Uruguay, Yugoslavia, Albania, and also France, for example—have suddenly had contracts canceled as a means of exerting political pressure upon their governments. And a breach of contract suit in a Soviet court always results in a decision in favor of the Soviet agency, as Israel discovered when it attempted to sue over failure of a Soviet agency to deliver oil in 1956. Furthermore, bloc economies are operated on the basis of recurrent "crash programs" and crises, often entailing last-minute revisions. In September 1963, for example, the Soviet Union, without warning, was suddenly forced to purchase \$500 million worth of Canadian grain because of agricultural failures. This will result in drastic curtailment of purchases elsewhere for hard currency.

Soviet missions often use aid projects to influence the recipient government politically. Difficulties in the completion of projects are

attributed to "anti-Communist" officials in the recipient government, who are obstructing progress out of political spite. Their replacement by pro-Soviet officials results in a swifter flow of aid. For example, by publishing an article by a Ceylonese Communist on Soviet aid to Ceylon in the authoritative journal *Kommunist*, Moscow, No. 11, 1963, Moscow, in effect, gave the Ceylonese Government a powerful hint to dismiss "anti-Communists":

In India, a plant with an output of more than a million tons of steel was completed within 4 years of the signing of the agreement, while in Ceylon, almost that time elapsed during the planning of an enterprise to produce 60,000 tons of steel. In part this disparity is due to the fact that supervision of our projects is in the hands of persons known for their open anti-Communism.

Furthermore, the Soviet bloc has a mania for self-sufficiency born of fears of "imperialist" blockades and boycotts in retaliation for Communist aggression. There is little doubt that the Communist countries will abandon an overseas supplier as soon as Communist planners can increase the domestic supply. The Russian newspaper *Kazakhstanskaya Pravda* on June 4, 1963, urged redoubled efforts to develop domestic ore deposits. "And then," said the paper, "imported ore, already coming to your rescue, will no longer be helping your progress. We need our own dependable ore base."

Furthermore, mining enterprises in foreign countries which have been built with Soviet bloc assistance will be largely equipped with bloc machinery. Replacement of such equipment or the supply of spare parts depends upon the pleasure of the Soviet Government, in contrast to machinery supplied by the many free world primate suppliers independent of government control. With the Soviet and the East European press constantly complaining about the shortage of spare parts and equipment for domestic industry, there is cause to wonder how a foreign request for some item in short supply would be honored.

Soviet bloc equipment is greatly inferior in any case, and usually needs repair rapidly. For example: According to *La Prensa*, Buenos Aires, April 25, 1963, quoting the Public Accounts Committee, the Argentine State Petroleum Monopoly (YPF) bought about \$38 million worth of Soviet oil equipment in 1958. The deal was arranged in irregular fashion. YPF was obligated to pay for deliveries even though its own experts rejected most of the equipment because, to quote *La Prensa*, it was "of limited use owing to its imperfect design and excessive weight, and unfavorable comparison with similar equipment already in use in the oil wells. The same must be said of derricks and electrical equipment, all of excessive weight and of a design such as to require constant repair and maintenance." The Committee's report quoted numerous findings by YPF engineers such as: "gave worst possible results and have been withdrawn from service"; "of ancient design and rudimentary technique"; "inferior to machinery bought in the United States and other Western countries." The report was forwarded to the Public Prosecutor and the Court of Accounts.

In short, acceptance of Soviet technical assistance in the construction of an extractive enterprise may give the developing country an enterprise very much like those in the Soviet bloc, so expensive and inefficient that these countries have been forced to import ores.



## THE IDEOLOGY OF RAW MATERIALS

The last decade has seen some significant shifts in Soviet ideology to narrow the gap between it and practical requirements. In the days of the Spartan self-sufficiency of Stalin's "Fortress Russia," Soviet propagandists loudly labeled any extraction of raw materials by an industrialized country from overseas as "colonialism." Furthermore, the capitalist states importing such raw materials were doomed to predatory wars among themselves over possession of these valuable possessions. Lenin's very concept of "imperialism" hinged upon the alleged compulsion of the industrialized capitalist state to seize additional markets and sources of supply.

The entry of the Soviet bloc into the same activity of extracting raw materials from the same areas will pose a problem for Soviet propagandists which can doubtless be solved through adroit use of semantics. But the Soviet bloc will increasingly share with the industrialized free economies the problems of the delicate relationships with the developing countries.

*Imports of copper by Communist Countries from the West,<sup>1</sup> 1955 and 1958-62*

[In thousands of metric tons]

Year	U.S.S.R. <sup>2</sup>	European satellites <sup>3</sup>	Total European Soviet bloc
1955	40	37	77
1958	63	36	128
1959	118	55	173
1960	106	60	166
1961	80	67	147
1962	101	70-75	171-176

<sup>1</sup> Includes ingot, wire bar, and such wrought forms of copper and copper alloys as rolled metal, bare wire, and castings and forgings.

<sup>2</sup> From official trade statistics.

<sup>3</sup> Based on data of exporting countries.

## THE CRISIS IN SOVIET AGRICULTURE—I

(By S. Kabysh)

Ever since Khrushchev was elected First Secretary of the Soviet Communist Party at a Central Committee plenum held in September 1953, he has been devoting major efforts to Soviet agriculture, and in doing so has set himself up as an all-round expert in this field of the Soviet economy. The effort began at the plenum itself, which announced a program for a further upsurge in all branches of agriculture aimed at "sharply increasing food supplies to the workers within 2 to 3 years and giving the entire collective farm peasantry a high standard of living" (Pravda, Sept. 7, 1953). Khrushchev himself declared that Soviet agriculture was "the best and most highly mechanized in the world," adding that the country had sufficient reserves of grain and a surplus for export (Pravda, Sept. 15, 1953). Even as these brave words were being spoken, Soviet agriculture was in a highly critical state and was suffering from neglect: contrary to Khrushchev's claim, grain output was so low that the basic needs of the population could scarcely be met. Cereal yields were below pre-war level and per capita output in 1953 was only 412 kilograms, compared with 527 kilograms in 1913, before the Bolshevik revolution ("S.S.S.R. v tsifrah v 1962 godu; (The U.S.S.R. in Figures in 1962)," Moscow, 1963, pp. 7, 9, and 14).

In the years since the announcement of the new era in agriculture in 1953, Khrushchev has been forced by the realities of the situation to devote special attention to the agricultural problem, and it has been the subject of much discussion at party congresses and Central Committee meetings over the last 10 years. Khrushchev has on several occasions made extended trips to key agricultural areas, where he has summoned mass meetings on the spot, attended by experts and administrators, in an effort to discover an answer particularly to the vexing question of how to raise grain production as a prerequisite to the development of Soviet agriculture as a whole.

### 1. THE GRAIN QUESTION AND THE CULTIVATION OF THE VIRGIN LANDS

During the past decade the Soviet leaders have regarded higher grain output as the main target on the agricultural front. Among the numerous measures adopted to this end, the so-called virgin lands campaign has been the most spectacular. Announced at the March 1954 plenum of the Party Central Committee by Khrushchev himself, who was its initiator, the campaign aimed to bring under cultivation 13 million hectares of land in Kazakhstan, Siberia, parts of the Urals and the Volga region in a program intended to secure an additional 18 to 20 million tons of wheat a year. It was essentially a program of overcoming the grain shortage by increasing the sown area rather than trying to obtain higher yields from the traditional grain-growing regions by intensive use of fertilizer. According to an

official Soviet source, by 1962 the amount of arable land in the Soviet Union had been increased by 42 million hectares by plowing up virgin or fallow land (Pravda, Mar. 6, 1962). As a result of the campaign, the area sown to cereals increased greatly, as indicated by the table below:

[In millions of hectares]

	1913	1953	1958	1961	1962	1963
Total sown area.....	118.2	157.2	195.6	204.6	218.0	218.1
Grain crops.....	104.6	106.7	125.2	128.3	135.9	129.6
Areas planted to corn, silage, and green fodder.....	2.2	3.5	19.7	25.7	37.1	33.9

Source: "Selskoe khozyaistvo S.S.S.R. (Agriculture in the U.S.S.R.)," Moscow, 1960, p. 132; "S.S.S.R. v tsifrakh v 1962 (The U.S.S.R. in Figures in 1962)," Moscow, 1963, p. 137; Statistichesky vestnik, No. 9, 1963, p. 80.

From the above it may be seen that although in 1963 the sown area had risen by 61 million hectares compared with 1953, the area sown to cereal crops increased by only 23.9 million hectares, despite the fact that the grain shortage was still acute.

The planting of grain on millions of hectares of land in Kazakhstan and Siberia has not only resulted in great financial cost but has also diverted important manpower resources from the grain-growing areas in the European part of the Soviet Union. The sown area here has since dwindled steadily, 11 oblasts in the central zone of the Russian Federal Republic having dwindled from 7.5 million hectares of land under cereal crops in 1953 to 2 million hectares in 1961 ("Narodnoe khozyaistvo S.S.S.R. v 1961 godu," p. 325). In some oblasts the former arable land completely ceased to be cultivated; in Kirov oblast alone, since 1953, 144,000 hectares of arable land have been turned over to fallow. Preoccupation with the virgin lands has also resulted in reduced yields from the land still cultivated in the traditional grain-raising areas. In Smolensk oblast, for example, where 0.7 metric ton of grain was harvested per hectare in 1940, only a little over 0.4 metric ton was harvested in 1961. In Ivanovo oblast the yield dropped from 0.9 to 0.6 metric ton (Ekonomicheskaya gazeta, No. 9, 1963).

Many other official figures can be cited to show the degree of loss in production in the older producing regions. Between 1953 and 1960 the area sown to cereals fell by 0.7 million hectares in the Volgo-Vyatsk belt, by 0.6 million hectares in the Central Black Earth belt and by about 1 million hectares in Belorussia. In the Ukraine the area sown to cereals had dropped by 3.1 million hectares, 2.3 million hectares of this being for winter wheat alone. The story was much the same in Moldavia, Georgia, Latvia, and some other Soviet Republics ("Narodnoe khozyaistvo S.S.S.R. v 1961 godu," pp. 324, 326). The overhasty decision to switch sowing of cereals from the traditional grain-growing areas to the virgin lands has admittedly cost the Soviet Union millions of tons of winter wheat: in the Ukraine alone, the gross yield of high-quality grain has fallen by 5 million tons owing to reduction of the sown area, despite the fact that the yield per hectare of winter wheat in the Republic in 1962 was slightly over 2 metric tons as against less than 0.5 metric ton in Kazakhstan ("Narodnoe khozyaistvo S.S.S.R. v 1962," pp. 350, 351).

The Soviet grain crisis which reached an acute stage in 1963 was to a considerable extent due to failure of the grain harvest in Kazakhstan. Khrushchev claimed to place high hopes on this area, which he had repeatedly declared in his speeches would play a vital role in grain production. At the March 1962 plenary session of the Party Central Committee, he had called on the Kazakhstan Party leaders to raise the production of cereals to 2 metric tons per hectare within a few years, an unrealistic goal in view of the fact that yields have been steadily falling over the last years, as the following table indicates:

	1956	1958	1962
Area sown to cereals.....million hectares..	22.5	22.2	24.9
Gross harvest of grain.....million tons..	23.8	22.0	15.8
Deliveries of grain to the state.....do.....	16.1	14.8	8.2
Yield.....metric tons..	1.1	.9	.6

Sources: "Narodnoe khozyaistvo S.S.S.R. v 1958 g.," p. 399; "Selskoe khozyaistvo S.S.S.R. Statisticheskyy sbornik," pp. 90, 214; "Narodnoe khozyaistvo S.S.S.R. v 1960 g.," pp. 395, 431; "S.S.S.R. v tsifrakh v 1962 g.," pp. 192, 194.

In the poor harvest of 1963 the worst affected regions were Kazakhstan and Siberia. As Kazakhstan Party Central Committee Secretary Yusupov admitted, in Pavlodar oblast, which has a sown area of about 4 million hectares, average grain yield per hectare was little more than 0.2 metric ton (Kazakhstanskaya pravda, November 17, 1963).

Although the inadvisability of relying on the virgin lands to solve the Soviet grain shortage must have become obvious, Khrushchev asserted in 1962: "The cultivation of the virgin lands is a great feat by our heroic people in the construction of Communism and it will live through the centuries" ("Zernovoe khozyaistvo S.S.S.R. (The U.S.S.R. Grain Economy)," Moscow, 1962, p. 6). In fact, as late as December 1963, Khrushchev argued that the virgin lands would recoup the entire cost of the investment in their cultivation and would even bring the state a profit of 3 billion rubles; in 1963, addressing a Central Committee plenum and holding in his hands a memorandum from the Central Statistical Directorate, he said:

Between 1954 and 1962 the state invested 6.7 billion roubles in the zone of cultivation of virgin and fallow lands, over and above normal capital investment. From commodity grain alone the state not only covered all investment in agriculture in the virgin lands but in addition made about three billion roubles in clear profit over this period (Pravda, Dec. 10, 1963).

Notwithstanding such claims, cautious criticism, hedged about with reservations, has now been appearing in the Soviet press with regard to Khrushchev's virgin land campaign. Kommunist, the Party theoretical organ, carried early in 1963 a lead article which openly admitted that, "although volume of agricultural production has remained high compared with 1953, slowing down of the tempo of development in agriculture has caused legitimate concern" (Kommunist, No. 13, 1963). The anxiety of the party leaders was further reflected at the same time, in a memorandum from Khrushchev to the Central Committee presidium in which he called for study of the reasons for the stagnant situation and for the adoption of counter-measures, failing which, he said: "We may relapse into the situation which existed in 1953" (Kommunist, No. 13, 1963, p. 9). Kommunist

complained of inefficient exploitation of the virgin lands, where uninterrupted sowing of wheat for the past 5 or 6 years was said to have resulted in wind erosion and the spreading of wild oats like weeds over the fields. Without naming those responsible, Molodoi Kommunist (No. 10, 1963, p. 12) charged: "In the chase for expansion of the sown area, the rule that it is impermissible to allow harvests to decline on stable agricultural land is being forgotten."

Failures in the harvest of agricultural crops have been recurring almost every year in various parts of the Soviet Union. The areas most often afflicted by drought are the Volga region, the Urals, western Siberia, Kazakhstan, and part of the North Caucasus. In consequence of drought in the Volga region, average wheat yield between 1949 and 1956 did not exceed 0.5 metric ton per hectare and between 1947 and 1957 drought recurred five times in the region (Selskoe khozyaistvo, Sept. 26, 1957.) Drought-bringing east winds have also had a fatal effect on the crops in the fertile North Caucasus: In 1957, 10,000 hectares of cereals were lost in Rostov oblast. In the Ukraine, winter wheat is not infrequently a victim of frost, the latest occasion having been in 1963.

Unfavorable weather conditions have done particularly great damage to grain crops in Kazakhstan, where precipitation only amounts to between 200 and 350 millimeters annually, chiefly in July and August when the grain is ripening, and at harvest time. Drought recurs in the spring, when the young shoots most need moisture. The vegetation period is short and cold spells often return in May or even later. Frost and snow may occur in August and September. In winter strong winds sweep the snow from the fields and in early spring and summer cause soil erosion. In Pavlodar oblast alone, 456,000 hectares of cereal crops were destroyed by gale-force winds in 1960, according to Ogonyek (No. 29, 1962, p. 11). In September 1963, 5 million hectares of arable land in Tselinny Krai (Virgin Land Krai) were reported to be menaced by wind erosion. (Kazakhstanskaya pravda, Sept. 25, 1963). Wind erosion has also caused heavy losses in Siberia; in 1960, the sowing of 68 percent of the Kulundinsk steppe was blamed for wind erosion and dust storms, which were said to be ruining 70 percent of the land then under cultivation in the steppe (Selskoe khozyaistvo Sibiri (Agriculture in Siberia), No. 8, 1962, p. 31.)

Heavy damage to crops is also caused by weeds. In the Altai Krai, according to Sovetskaya Rossiya (Sept. 29, 1962), the fields were a sea of weeds, making it difficult to see the grain, which was three to four times less than the wild oats and thistles. In one of the rayons, only 0.45 metric ton of grain per hectare was harvested from a total area of 628,000 hectares, owing to weeds.

## 2. OBLIGATORY CORN PLANTING AND OTHER MEASURES TO INCREASE GRAIN OUTPUT

Of all the many examples of Khrushchev's meddling with agriculture, the one which earned him the greatest amount of unpopularity among the collective farmers was his order to grow corn everywhere in the country, regardless of climatic or soil conditions, in order to swell the grain harvest and provide green fodder for cattle. Corn growing did increase: In 1962 the area planted to corn was 37.1 million

hectares as compared with 25.7; from 2.2 million hectares in 1913 and 3.5 million in 1953, it jumped to 19.7 million in 1958, 28.2 million in 1960, 25.7 million in 1961, and 37.1 million in 1962.

But Khrushchev's hopes of using corn for grain were doomed to failure. Although in 1962 corn made up 28 percent of the entire area sown to grain crops, only 7 million hectares out of the 37.1 million were harvested as grain, the remaining 30 million hectares being cut green for silage ("S.S.S.R. v tsifrakh v 1962 godu," pp. 139, 141). While there are other reasons for the failure of the corn project, one of the main reasons has certainly been the effort to raise corn by fiat in unsuitable areas. In the last few years one-half of the corn growing has been concentrated in regions where it had not been grown before on any large scale and in several oblasts, krais, and republics much of the corn goes to waste as grain because it is harvested over vast areas before the kernels are fully formed. In 1960 in the Ukraine alone, 4.2 million hectares—40 percent of the area planted to corn there—was harvested in this way. And even the amount harvested as silage was comparatively small. The collective and state farms averaged only 10 metric tons of silage per hectare in 1960 ("Zernovoe khozyaistvo," Moscow, 1962, p. 74).

This wasteful use of fertile land has now compelled Khrushchev to back down from his former insistence on mass planting of corn. At the Central Committee plenum in December 1963, he admitted that in many regions the season when the kernels take form coincides with the prevalence of dry winds which ruin the harvest. He went on to say that it would therefore be advisable in such areas to sow wheat rather than corn, adding: "We do not," he said, "swear eternally by one particular crop; we do not intend to pray to it" (Pravda, Dec. 15, 1963), a statement which should be compared with one which he made in 1955 to a conference of agricultural workers and administrators:

Some of our experts are spreading incorrect views to the effect that corn is a southern crop, that the belt of its distribution is restricted and that it is a crop which demands a heavy expenditure of labor. This is not so. Now we have, so to speak, "emancipated" corn by recognizing that it is expedient to harvest it at the milk-wax stage of maturity, without carrying its grain to dry stage. By so doing we have removed the limits to the extension of this crop (Selskoe khozyaistvo, Apr. 8, 1955).

Side by side with the emphasis on corn to the neglect of other crops have been other ill-advised measures dictated from above. In the course of the past 2 years much of the expansion of the area under cultivation has been taking place at the expense of the long-established grass-arable system. What were called the "harmful consequences" of this system were brought to the attention of farmers in the course of a nationwide campaign in 1962, following Khrushchev's condemnation of the system at a plenum of the Party Central Committee in March 1962 and his proposal that collective and state farms change over to an intertilling (propashnaya) system. As a result of the abandonment of the grass-arable system, the area sown to annual and perennial grasses, which had reached 32.3 million hectares, decreased in 1963 by 11.4 million hectares (Statisticheskyy vestnik, No. 9 1963, p. 80). The search after new land has also resulted in a sharp cut in crop rotation and autumn fallow. At the beginning of 1963 only 5.3 million hectares were fallow in autumn as compared with 24.0 million hectares in 1958.

## 3. GROSS YIELDS OF GRAIN CROPS AND GRAIN EXPORTS AND IMPORTS

Measures to extend the sown area in the Soviet Union have naturally made it possible to raise gross yields, but the per capita increase in grain production has remained very small as the table below shows:

	1913	1953	1958	1962
Gross grain yield including all types of corn million tons..	88.0	82.5	141.2	147.5
Per capita grain production.....kilograms..	540.0	430.0	680.0	671.0
Gross grain yield, not including corn.....million tons..	83.9	78.8	124.5	124.2
Per capita grain production.....kilograms..	527.0	412.0	667.0	665.0

Source: "Narodnoe khozyaistvo v S.S.S.R. v 1961 godu (The U.S.S.R. National Economy in 1961)," p. 341; "S.S.S.R. v tsifrakh v 1962 godu (The U.S.S.R. in Figures in 1962)," p. 141.

It may be seen from the above that during the last 50 years per capita grain production has only risen by 38 kilograms and there is no sign of any great improvement in the near future. Meanwhile consumer demand for grain products has risen considerably. Among other factors involved is the population movement to the cities, with their greater demand for grain products. While in 1913 only 18 percent of the population lived in the cities, by 1962 city dwellers accounted for 51 percent of the Soviet population.

Despite the recurring grain shortages, the Soviet Government has regularly been exporting grain over the past few years. Official figures are as follows:

	Million tons		Million tons
1955.....	3.7	1959.....	7.1
1956.....	3.2	1960.....	6.8
1957.....	7.4	1961.....	7.5
1958.....	5.1	1962.....	7.8

The main importers of Soviet grain have been Eastern Germany, which imported 2.9 million tons in 1962; Czechoslovakia (1.4 million tons); Poland (0.9 million tons); Finland (0.3 million tons); Great Britain (0.4 million tons); Cuba (0.4 million tons); China (0.4 million tons); Brazil (0.4 million tons) (Source: "Vneshnyaya trgovlya SSSR za 1955-59 gody, Statistichesky sbornik (The Foreign Trade of the U.S.S.R. for 1955-59, A Statistical Handbook)," Moscow, 1961, p. 126; *ibid.*, for 1960, p. 48; "Statistichesky obzor vneshnei trgovli za 1962 (Statistical Survey of Foreign Trade for 1962)," pp. 59-60). The amount of grain imported during the same period was comparatively small:

	Thousand tons		Thousand tons
1955.....	305.6	1959.....	256.5
1956.....	493.6	1960.....	240.4
1957.....	152.5	1961.....	678.7
1958.....	781.6	1962.....	46.2

Source: "Vneshnyaya trgovlya S.S.S.R. za 1955-59," pp. 98-99; *ibid.*, for 1960, p. 35; *ibid.*, for 1962, p. 42.

The main exporter of grain to the Soviet Union was Rumania, followed by Canada, from which 485,600 tons of wheat were purchased in 1961.

#### 4. SUPPLY OF AGRICULTURAL MACHINERY

The increase in the area under grain crops in the Soviet Union has necessitated more machinery and enormous sums have been spent on providing it. Output is shown in the table below:

[In thousands of units]

	1953	1958	1962
Tractors in physical units.....	744	1,001	1,329
Tractors in units of 15 horsepower.....	1,239	1,750	2,400
Grain harvesters.....	318	502	520
Trucks, including tank trucks.....	424	702	875

Source: "S.S.S.R. v tsifrakh v 1962 godu," p. 160; Statisticheskyy vestnik, No. 9, 1963, p. 93.

The supply of machinery is, however, still far from adequate to meet the demand and Krushchev admitted at the March 1962 Central Committee plenum that there were serious delays in agricultural operations because of this shortage. Available supply and requirements were given as follows:

Type	Machinery available as of Jan. 1, 1962	Quantity needed
Tractors.....	1,168	2,696
Grain combines.....	503	845
Silage harvester combines.....	121	257
Corn harvester combines.....	38	111
Sugarbeet harvesters.....	36	257
Automatic loaders.....	790	1,650
Tractor trailers.....	292	820
Tractor planters.....	947	1,628
Tractor ploughs.....	784	1,180

Source: Pravda, Mar. 6, 1962.

There is much complaint that such tractors, combines, and other mechanical equipment as are available are not being efficiently used. In 1961, 193,000 tractors were reported to be inactive only because the requisite repair parts were not available. In the same year, 21,000 grain combines and 20,000 forage harvesters had not been repaired by harvest time because of a shortage of spare parts. In the Ukraine 7,000 of the largest tractors were out of use during the harvest for the same reason. At the same time more than 2,000 million rubles' worth of spare parts for which there was less demand had accumulated in the stores of collective and state farms (Ekonomicheskaya gazeta, 1962, No. 35, p. 13).

Even if every tractor in the U.S.S.R. had been in good repair, there was only one tractor to each 168 hectares of arable land in 1962 ("S.S.S.R. v tsifrakh v 1962 godu," p. 137), as compared to only 41 hectares in the United States 6 years earlier, in 1956; 49 hectares in Canada; 22 hectares in Norway; and only 16 hectares in Great Britain and West Germany ("Selskoe khozyaistvo kapitalisticheskikh stran: statisticheskyy spravochnik (The Agriculture of the Capitalist Countries: A Statistical Handbook)," Moscow, 1959, p. 282). Because of the shortage of usable agricultural equipment in the U.S.S.R. the sowing and harvesting are always done negligently, in haste, with considerable delay and, in general, inefficiently.



#### 5. ARTIFICIAL FERTILIZERS

The production and use of artificial fertilizers in the U.S.S.R. has been greatly neglected. The following table shows the quantities of all types of fertilizer which were delivered to Soviet farms in the period 1953-62:

	Million tons		Million tons
1953-----	6.6	1961-----	12.0
1958-----	10.6	1962-----	13.6
1960-----	11.4		

Source: "Narodnoe khozyaistvo S.S.S.R. v 1961," p. 380; Statistichesky vestnik, 1963, No. 9, p. 93.

Soviet production of artificial fertilizers is far behind that of countries with intensive land cultivation. In the United States the average quantity of artificial fertilizer used per hectare of arable land is reported as 227 kilograms, in West Germany 1,050, in England 766, in East Germany 713, and in France 507 kilograms (Selskaya zhizn, Sept. 18, 1963). In the Soviet Union only 62 kilograms are produced per hectare (Pravda, Dec. 10, 1963), and even then the proportion of effective fertilizer is very small, the superphosphates and potassium salts chiefly produced containing only 14 to 20 percent of nutritious material and, in addition to being ineffective, destroy confidence in their usefulness to such an extent that it is said that farm managers are unwilling to use them. According to the Ministry of Transport, there were 401,900 tons of unremoved fertilizer in October 1963 (Ekonomicheskaya gazeta, 1963, No. 41, p. 40). Moreover, fertilizer sent from the plants often fails to reach the farms. According to Pravda, 15 to 20 percent of the quantity produced is lost in transit or goes to waste lying out in the open at railroad stations, about 2 million tons being lost in this manner in 1961 (Pravda, Nov. 21, 1963).

Of the 22 million tons of artificial fertilizer planned for production in 1964, Khrushchev has proposed that 10 million tons be used for grain crops in the Northern Caucasus, the Central Black Earth Belt, and certain regions in the Ukraine. According to him, the use of fertilizers in these areas of high grain yield will produce an extra 14 to 20 million tons of grain.

In order to reach the goal of 70 to 80 million tons to be produced annually by 1970, existing undertakings are to be expanded to produce an additional 20 million tons annually and 55 new plants will be built, each to produce a specific type of fertilizer. The cost of construction and reequipping is estimated at 4,500 million rubles.

A special association called Soyuzselkhozkhimiya (All-Union Agricultural Chemistry) is to be set up to deal with all questions relating to the application of chemistry to agriculture. Special new training establishments will be set up for "agrochemists" and the number of students to be admitted to existing ones will be increased considerably. A total of 19,000 agrochemists with higher education and over 30,000 with secondary education will be needed for agrochemical service (Izvestia, Dec. 8, 1963).

In addition to the above measures, there are many preparatory measures which the planners call for to ensure a rational use of artificial fertilizers. Thousands of millions of rubles will be needed for the construction of storehouses for fertilizer since, at the beginning of 1963, there was, in the entire Soviet Union, only enough covered space

to store 2.8 million tons (Pravda, Nov. 21, 1963). New implements will have to be designed for the large-scale use of fertilizers and the production of machines for loading, unloading, and spreading fertilizer will have to be increased. Unless such machinery is available the use of artificial fertilizers will also greatly increase the amount of agricultural labor required. Already "about 36 percent of labor goes into operations connected with the bringing of mineral and organic fertilizers to the soil" (Pravda, *ibid.*).

#### 6. CAPITAL INVESTMENT IN AGRICULTURE

The low level of agricultural production is to some extent the result of the very limited degree of capital investment. The following table shows the annual volume of agricultural investment:

[In thousands of millions of rubles]

	State investment	Collective farm investment	Total
1953.....	1.0	1.2	2.2
1954.....	1.8	1.4	3.2
1955.....	2.3	2.1	4.4
1956.....	2.4	2.3	4.7
1957.....	2.7	2.2	4.9
1958.....	2.7	2.8	5.5
1959.....	2.5	3.5	6.0
1960.....	3.1	3.2	6.3
1961.....	3.7	3.2	6.9
1962.....	4.6	3.4	8.0

Source: "S.S.S.R. v tsifrakh v 1962 godu," p. 249.

As the table indicates, state investment is roughly equal to that from kolkhoz funds. Most of the former goes into the large state farms, of which there were, in 1962, 8,571, with a total arable area of 94.8 million hectares. Accordingly, in 1962 the capital investment per hectare was 48 rubles ("S.S.S.R. v tsifrakh v 1962 godu," p. 170).

Capital investment in collective farms is made from the farm special funds made up of annual allotments from farm cash income. In 1962, when the collective farms owned 114.4 million hectares of cultivated land, the investment per hectare was 28 rubles. For both state and collective farms, with a total agricultural investment of 8 billion rubles and a total cultivated area of 216 million hectares, the average per hectare in 1962 was 37 rubles.

In other countries investment in agriculture is more rational, without the great annual variations in the amounts invested, whereas in the Soviet Union the amount has increased every year since 1953. The following table gives comparative figures for other countries:

	Year	Area sown	Capital investment	Investment per hectare
		<i>Million hectares</i>	<i>Million</i>	
Canada.....	1951	25.0	\$699	\$28
United States.....	1951	139.2	\$5,300	\$38
West Germany.....	1953	8.0	DM1,100	DM138

Source: "Selskoe khozyaistvo kapitalisticheskikh stran," pp. 108, 114, 116, 560, 566.

## 7. THE CONSTRUCTION OF A COMMUNIST SOCIETY AND SOVIET GRAIN PRODUCTION

The "Plan for the Construction of a Communist Society" which was adopted at the 22d Congress of the Soviet Communist Party in 1961 called for the production of 164 million tons of cereal crops in 1962, but the actual harvest was 16.5 million tons short of this goal ("S.S.S.R. v tsifrakh v 1962 godu," p. 148). The planned figure for 1963 was 172.1 million tons, but this was also not reached because a considerable part of the crop was lost as a result of prolonged drought, a hard winter and general inefficiency. At a conference of agricultural officials in Krasnodar, Khrushchev stated:

Our country often suffers from drought, especially the regions of western Siberia, Kazakhstan, the Volga, and the southern Ukraine. As you know, the winter of 1962-63 was very cold and severe in many European countries. It did not pass by our territory either. In many regions there were extraordinarily low temperatures for a prolonged period and, most serious of all, the ground was not covered by snow during the hard frosts. Therefore large areas of winter crops, chiefly wheat, were either completely ruined or were so thin that other crops had to be sown (Selskoe khozyaistvo, Oct. 2, 1963).

Khrushchev repeated his admission of the crop failure at a meeting with foreign journalists on October 25, 1963, in Moscow. With respect to Soviet purchases of wheat abroad he said:

If we are buying wheat from capitalist countries, it means that we do not have enough wheat of our own this year. \* \* \* Great areas of virgin land in Siberia and Kazakhstan as well as an extensive area in the European part of the country suffered from continuous drought (Selskaya zhizn, Oct. 27, 1963).

The loss in cereal crops and the calls of the party and the Government for economy in the consumption of bread have led to a panic which spread to the state and collective farms. Farm officials, especially on the virgin lands of Kazakhstan, made strenuous efforts to conceal harvested grain from records to avoid being held without bread: one state farm director was reported to have held back over 2,700 tons (Kazakhstanskaya pravda, Sept. 27, 1963).

Weather conditions in 1963 were in fact unfavorable for agriculture, although this was not true everywhere in the Soviet Union. The losses in the Ukraine were described in one report as follows:

At the end of February the snow melted quickly, but then came such frosts as we had not experienced for many years. The winter crops were ruined. The great labor of the farm workers was wasted and there were enormous losses of material—seed and fuel (Ekonomicheskaya gazeta, 1964, No. 1, p. 6).

The conditions thus described account for the fact that the figure of 129.6 million hectares for the total area sown to cereals, originally announced by the Central Board of Statistics, had by harvest time been reduced to 125 million, 4.6 million hectares having been written off (Statisticheskyy vestnik, 1963, No. 9, p. 80). Large losses occurred in the course of harvesting and some enormous areas were not harvested at all. At the time of writing no figures had been given for the actual total grain harvest of 1963: a Tass statement published abroad but not in the Soviet Union reported that it would be 18 percent less than that of 1962 (New York Times, Oct. 1, 1963). The Tass report added, however, that deliveries of grain to the state would be the same as in 1959 and 1960. This may well be true, since in recent

years the quantity of grain collected from the collective farms has been based on so-called socialist obligations, not with planned targets, and the amount collected may be quite arbitrary, making no allowances for the requirements of the kolkhoz workers and the kolkhoz economy itself.

The Tass report on the total grain harvest is much too optimistic. As stated above, 4.6 million hectares of cereals had been written off before harvesting. On a further 17 million hectares crops remained uncut or unthreshed (Selskaya zhizn, Oct. 19, 1963). Then, in his speech at Krasnodar, Khrushchev stated that, in parts of Siberia, Kazakhstan, the Volga region, and the southern Ukraine, the crops had suffered from drought: since in these regions the total area sown to cereals was 53 million hectares, a loss of only 0.3 ton per hectare would mean a total loss of about 16 million tons. The Soviet press also reported a snowfall at the height of the harvest, in mid-September, on the virgin lands of Kazakhstan, causing officials serious concern (Pravda, Sept. 23, 1963), and that on September 20 there were still 22 million hectares unharvested in Kazakhstan and Siberia. Additional losses occurred while grain was being harvested in bad weather in the second half of September. And even the grain which was harvested and threshed was in some cases left in the open to rot on account of lack of storage facilities:

They are in a hurry to take the grain away, they dump it in a heap, enter it in the register and include it in the report! There are percentages, there are piles of unprotected grain, but there is no marketable food reserve. Has anyone ever happened to see blackened heaps of grain and an excavator scooping up the smoky, moldering mass which is turning green at the edges? (Molodoi kommunist, 1963, No. 10, p. 11).

As a cumulative result of these various types of losses, the total grain harvest for 1963 may be estimated as approximately 25 percent less than that of 1962. Yet only 2 years ago, in his report to the 22d Party Congress in 1962, he had confidently announced:

In the very near future the Soviet Union will occupy such a position in the international grain market that the imperialist gentlemen will begin to feel how our agriculture is expanding ("XXII s'ezd Kommunisticheskoi partii Sovetskogo Soyuza: Stenografichesky otechet (The 22d Congress of the Communist Party of the Soviet Union: Shorthand Report)," Moscow, 1962, p. 182).

After 10 years of failure to solve the grain problem by expanding the area under crops, Khrushchev expounded, at a plenary session of the Party Central Committee in December 1963, his new program for solving the grain problem, by raising yields (Pravda, Dec. 10, 1963). He declared that, according to the grain plans approved by the 22d Party Congress, the annual grain requirement by 1970 would be 230 to 263 million tons. The use of artificial fertilizer would raise the average annual yield from the present 1 metric ton per hectare to 3 tons; with a yield of this size "it would be sufficient to have 77 million hectares under cereals," said Khrushchev. Instead of adding to the total area under cultivation, he would reduce it and plans to bring more virgin land under cultivation are being replaced by plans for improving the output of artificial fertilizer. From 1964 there is to be a complete change in the methods of improving Soviet agriculture.

## 8. THE PRIVATE SECTOR AND THE PAYMENT OF KOLKHOZ WORKERS

Collective farm regulations provide that every family on the farm may have a private plot of land of 0.25 to 0.5 hectare, one cow, one pig, sheep, goats, and poultry. The peasants gained this right by their stubborn resistance to the enforced collectivization of agriculture. Leaving an element of private property in the heart of a large collective enterprise was a concession forced from the party and the Government and completely contrary to the basic principle of "socialization" of all agriculture.

The official attitude is that this element of private farming was retained because of the impossibility of covering the needs of kolkhoz families with produce from the socialized farm, and it was supposed to be a temporary concession. What happened was that after the process of all-out collectivization was completed, the Government granted private plots in 1939 to agricultural specialists and to workers and employees living in rural districts. It was a practical necessity due to the fact that food products were not sold through the official trade network in rural areas and people in the above categories had to provide their own food.

In 1961 kolkhoz workers were privately cultivating 4.27 million hectares and employees in other branches of the economy farmed 2.47 million hectares, making a total of 6.74 million hectares or 3.3 percent of all the land under cultivation in the U.S.S.R. ("Narodnoye khozyaistvo v 1961 godu," p. 316).

Although private plots are managed by their owners alone, and their production is not included in state planning nor do they receive state assistance, the owners originally had to deliver to the state a certain proportion of their produce, such as milk, meat, potatoes, wool, and raw hides. This obligation was nominally lifted in 1958 but they were still obliged to contribute to the fulfillment of state delivery plans under a so-called "social obligation." In 1962 the state received from such nominally voluntary deliveries from private farms 26 percent of all potato deliveries, 7 percent of other kinds of vegetables, 34 percent of all eggs, 14 percent of all meat and poultry, and 15 percent of all wool ("S.S.S.R. v tsifrakh v 1962 godu," p. 172).

The total value of the agricultural produce sold in the markets of the Soviet Union in 1962 was 3,930 million rubles. Factory workers obtained from this source about 60 percent of the potatoes, almost one-half of the fruit, over one-third of the eggs, and one-quarter of the other vegetables. Private agriculture sold approximately 100,000 tons of meat in 140 cities of the R.S.F.S.R. alone (*Ekonomicheskaya gazeta*, 1963, No. 23, p. 41). And all this under great handicaps. Under the guise of the struggle with speculation and high prices, Government bodies load the private sale of produce with excessive formalities, and the Soviet press showers insults on those who show private initiative, whom they call "grabbers," "fleccers," "parasites," and, those who sell poultry, "carriion merchants."

The party press maintains that the "incessant cult of property" and the unexterminated "virus of individualism" are the reasons for the attachment of owners to their private plots (*Komsomolskaya pravda*, Sept. 15, 1963). In fact, payment for labor on the collective farms is, with rare exceptions, small, fluctuating, and dependent on many circumstances. A recent detailed investigation of labor wages

on collective farms in the fertile Ukraine indicated that a day's work earned 12 to 50 kopecks and that the proportion of kolkhozes paying low wages had risen from 10 percent in 1957 to 30 percent in 1961 (Ekonomicheskaya gazeta, 1963, No. 4, p. 21). Of a total of 367 kolkhozes in Kaluga oblast, according to a recent report, only very few had a system of regular wage payment: "in the rest there is no system and complete confusion. \* \* \* Little is distributed according to the days worked and what is credited is not paid for a year or two" (Selskaya zhizn, July 19, 1963).

There are still no Government provisions for the welfare of kolkhoz workers of pensionable age or those incapacitated for labor. At the last plenary session of the Party Central Committee, Khrushchev warned kolkhoz workers that "the present financial status of the country does not allow a comprehensive solution of the problem of providing the entire rural population with pensions" (Izvestiya, Dec. 15, 1963).

In the U.S.S.R. agricultural achievement is measured only in terms of the quantity of produce delivered to the state. The very large quantities of produce which are collected by the state, the low prices paid by the state, and the large deductions made from kolkhoz income for capital investment purposes are means of exploiting the kolkhoz masses and the main reasons for the small wages. And the small wages, together with the lack of provision for old age, go far to account for the desire to own private land. Labor expended on private farming, even in the limited time available, is so productive that it not only provides sustenance for the family but under favorable circumstances brings in additional income from the sale of produce.

The insecure and often hard life on a collective farm is another reason for the peasant's attachment to his private plot. The ancient urge to labor in freedom on one's own land is still very strong in the Soviet peasantry and the urge to become real masters over their land with no interference from outside will continue to be an obstacle to the realization of new Communist reforms on both state and collective farms.

## THE CRISIS IN SOVIET AGRICULTURE—II

### KHRUSHCHEV'S COSTLY EXPERIMENTS

(By Arthur Channing)

Nikita Khrushchev's 10-year reign over the Soviet Communist Party has been described as one of the most confusing and disappointing eras in the history of Soviet agriculture.

Mr. Khrushchev began his party leadership in 1953 by proclaiming that the U.S.S.R. already had become self-sufficient in grain production but 10 years later found himself in the embarrassing position of having to purchase millions of tons of wheat from the "capitalist" countries he had promised to outproduce.

Like his predecessors, he has been unable to achieve needed farm production levels under a system which insists on centralized party controls, denies private ownership of land and effectively discourages individual initiative.

Unable or unwilling to change the basic Communist agricultural system, Mr. Khrushchev turned to radical but almost uniformly unsuccessful experimentation. The issues were further clouded by a series of contradictory harvest reports.

The events of 1953-63 tell their own story.

In September 1953, Mr. Khrushchev echoed predecessor Georgi Malenkov's 1952 claim that the country's food problems had been solved by declaring: "Our country is well supplied with bread, we have the necessary state reserves and are exporting wheat on a limited scale."

By 1957, however, it was apparent that both Mr. Khrushchev and Mr. Malenkov had been mistaken. Although the Soviet party leader attempted to divert the public's attention by making Mr. Malenkov the sole scapegoat for earlier grain production exaggerations, the facts could not be permanently concealed.

Eventually, in December 1959, Mr. Khrushchev was forced to concede that the 1953 Soviet farm yields he had hailed as an agricultural milestone had, in fact, been virtually the same as those of 1913. He still refused to accept responsibility for his error, however, and continued to blame the already disgraced Malenkov. In the meantime, of course, 40 years had passed and the U.S.S.R.'s population had increased by some 30 million persons.

Kommunist, the principal Soviet Central Committee organ, made the significant admission that, in reality, the 1953 per capita harvest had been nearly 20 percent less than in 1913.

Meanwhile, in 1954, Mr. Khrushchev embarked on what has been called the biggest agricultural gamble of his career—a scheme to transform vast Soviet "virgin lands" areas into grain-producing regions. The theory in this case was that only a drastic expansion of the country's arable lands could meet the U.S.S.R.'s mounting grain requirements and make possible the needed increases in meat and

dairy products. Seemingly rational countersuggestions calling for more efficient cultivation of existing farm lands were ignored.

The Soviet party chieftain also plunged ahead with his plan to boost meat and dairy supplies. He abolished the grassland system of crop rotation and ordered intensive cultivation of cattle fodder crops—without, however, providing the necessary fertilizers and cultivation machinery for such an undertaking.

There followed a series of failures on all agricultural fronts. Serious shortages of farm machinery developed and there was a steady decline in yields per hectare. Soviet industry proved to be incapable of keeping up with the demand for workable equipment. Reports multiplied that thousands of tractors and harvesting combines were rusting in the fields for lack of spare parts.

Shortages of vegetables, fodder, meat, butter, and milk not only continued but worsened.

Grazing lands converted into cultivated fields suffered from continuous droughts, winds, a too-short ripening season, and excessive soil salinity. Farmworkers sent to the remote "virgin lands" were forced to endure the most primitive of living conditions. For many, tents were the only shelter in both summer and winter.

The principal virgin lands area of Kazakhstan, mainly because of an unusually good rainfall, produced impressive crops in 1956. Since then, however, the decline has been alarming. Grain deliveries from Kazakhstan decreased by 63 percent in 1961, by 62 percent in 1962, and 83 percent in 1963. It was belatedly realized that a major blunder had been made in the beginning by ignoring the known fact that Kazakhstan's rainfall only rarely exceeds 12 inches per year, whereas at least 32 inches is required for normal grain crops.

By 1963, Soviet officials appeared convinced that the whole "virgin lands" project had been an ill-advised experiment. There were signs of hasty new shifts in emphasis.

In December 1963, Premier Khrushchev unveiled still another plan to solve the country's present and future farm problems, this time by a sweeping reorganization and expansion of the U.S.S.R.'s chemical industry. He told a full meeting of the party's Central Committee that the country's poor farm production was now believed to have been caused by shortages of mineral fertilizers.

Mr. Khrushchev also admitted that the Soviet Union was in such straits that heavy grain purchases from the "capitalist" West offered the only available solution. He added that, "We still are short of grain, particularly wheat."

Thus, a decade of experimentation which began with unfounded boasts ended with admissions of failure. The long-sought answer to the U.S.S.R.'s chronic farm problems once again was made dependent upon still further experimentation.



### THE CRISIS IN SOVIET AGRICULTURE—III

#### "BREADLINES" IN THE SOVIET UNION

"My God! What is the world coming to! You have to stand in line for a crust of bread."

This ill-tempered remark by a Tashkent housewife, as reported in Pravda Vostoka (Oct. 18, 1963), symbolizes the frustration of Soviet housewives in the wake of the all-out crackdown on bread waste launched by the Government. From the days of the Czars, Russia has lived on bread, and even when other foods were scarce bread was nearly always available. Now bread is scarce and the government is enforcing a kind of rationing by social intimidation. The Soviet press is peppered with articles written half in admonition and half as warning of stronger measures to come, if the public does not cooperate in the drive.

According to the Tashkent paper, the exploding housewife was reproachfully warned by the saleswomen: "You should be ashamed to talk that way."

When the woman's turn came in the breadline, she handed over 2 rubles, and demanded six loaves of bread.

The saleswoman was stupefied with amazement:

"Why do you need so much? You have always taken only one loaf."

"None of your business," the woman seethed. "They did not put you here for that. You fulfill your plan."

The irate customer received only one loaf and the paper states that the saleswoman did the right thing in not satisfying the woman's full request.

The Pravda Vostoka article was compiled by a self-appointed group, all participants in a raid on Tashkent stores. At bread store No. 25 they found the clerk doling out flat cakes to the tune of 40 to a customer. When the raiders stepped up to the counter and inquired why she filled such large orders, the clerk asked: "What business is it of yours? I do what I want. You cannot lay down the law to me."

At bread store No. 11, situated between the dormitories of two technical schools, the raiders found another deplorable condition. The students patronized the store for bread for sandwiches for a late evening snack. Many students wished to purchase just a part of a loaf of bread, but the store refused to sell any but whole loaves.

Through the fault of this saleswoman, dozens of kilograms of bread are thrown out of the dormitories.

At grocery store No. 11, the investigators found the clerk would sell bread only to her friends. The team observed this operation:

Refusing one woman bread, saleswoman Comrade Pavlova beckoned for literally several seconds to a man standing to the side and said: "Take this bread to your plump wife, remember." Pavlova took several loaves of bread from behind the counter and gave them to the man; then he left the store.

The extent of the Government's drive to make the Soviet public bread conscious is shown in an article in *Leninskoye Znamya* (Oct. 5), published in Moscow. The reporters found that in public dining halls, bread was being wasted on a large scale.

In dining hall No. 20, the bread has been shifted from the tables to the counter next to the cashier. The only difference is that formerly it was laid out on the plates while now it was heaped in a common pile. Come up and take as much as you wish.

Those taking part in our check observed the following picture. Three girls came in to the dining hall. They got the dishes they ordered, and then the first one began to put pieces of bread on her plate - 2, 5, 8, 10. \* \* \* When the girls left, several crumbled pieces of bread remained on their table. And so it was with many diners.

The paper recommended selling the bread by the individual slice, and this practice is being adopted by many Moscow dining halls. It also reports that, after observing a group of students eating, educational campaigns within schools are being conducted to reduce waste.

#### FILL UP ON VEGETABLES

Going a step further, since both bread and meat are scarce, the Moscow paper advocates a reorganization of dining hall menus. Currently, they are strong on meat items with bread garnishes such as macaroni, noodles, and wheat porridge, and weak on vegetables. One looks in vain, according to the paper, for salads made of tomatoes and cabbage, Russian salad, stewed cabbage with meat or fish, or vegetarian dishes. The paper strongly advocates reducing the meat and bread items and building up the vegetables.

However, when the managers of dining halls were approached on the matter, they resisted. In fulfilling their annual "plan," meat and bread items added up faster than cabbage, carrots, potatoes, and beets, making it harder to fulfill the annual expenditure plan, let alone over-fulfill it and bring the dining hall manager a bonus.

*Leninskoye Znamya's* investigators went directly to the dining hall trust, and suggested that the little stands selling piroshki cut down on the meat and rice piroshki and substitute vegetable filling.

They explained to us in the dining hall trust: "It is very simple. A meat piroshok costs 8 kopecks, while a cabbage piroshok costs 4."

It turns out that the notorious stumbling block is involved here again. It is easier to fulfill the plan with meat and rice than with cabbage.

Only time can tell whether the plan to conserve bread and meat will triumph over a manager's desire to win his annual bonus.

[From the Wall Street Journal, Feb. 24, 1964, p. 6]

## THE CRISIS IN SOVIET AGRICULTURE—IV

### SOVIET CROP WOE MAY EXCEED INDICATIONS

MUNICH.—Russian agriculture may be in an even bigger mess than recent purchases of grain by Communists in the West indicate. And farm problems may force policy changes in the Kremlin, such as a retreat from long-held socialistic economic dogmas.

These were the opinions of 40 top Kremlinologists from the Western World—men who make foreign ministry, State Department, or scholarly careers of evaluating trends in the Communist world. They gathered here for the first international symposium on Soviet Agriculture, sponsored by the Institute for the Study of the U.S.S.R., a respected emigre-staffed analytical organization. Their purpose was to evaluate the situation behind the Iron Curtain in light of Communist farm troubles.

It is general knowledge that Russia experienced a disastrous crop harvest in 1963. Communists have obscured the extent of the catastrophe, but they can't hide the purchase of nearly \$1 billion of wheat from the West. Authorities at this meeting estimate grain output in the Soviet Union last year at 30 percent less than the 147.5 million metric tons of 1962 and 40 percent less than the 172.1 million metric tons set as the 1963 target.

One Soviet publication recently published data implying that grain output totaled about 115 million metric tons last year. No analyst here would accept that figure. The consensus placed the total closer to 105 million metric tons, although a few said the figure might have been as low as 95 million. (In Washington several days ago some analysts put the figure as low as 93 million metric tons.)

The analysts noted, however, that, even if the Soviet figure is accepted, it shows a disastrous drop from 1962, far worse than initial Soviet reports.

#### CROP WAS FIFTH FAILURE IN ROW

This was the fifth successive disappointing crop. During these five years the average annual increase in agricultural production has been about 1 percent, compared with the 8 percent planned, it was said.

The weather is only partially to blame, the authorities said. The basic causes are mismanagement, too much control by politicians who know little about farming, lack of adequate incentives for peasants, shortages of skilled people, and inadequate investments.

The effect of crop failures is spreading throughout the Soviet economy. The wheat supply is likely to remain tight within the Soviet bloc, but is unlikely to become precarious unless another bad crop follows that of 1963, the authorities said.

However, corrective measures may result in major industry dislocations. Some Soviet oil engineers, for example, may be diverted

into petrochemicals because chemical engineers are short. This could hurt Soviet expansion in the petroleum industry. Big expansions begun in mining of potassium salt and phosphorite deposits necessitate switching of machinery from other mining operations. Iron ore developments may suffer. This pattern is reflected throughout the Soviet empire, and even the most astute planners can't foresee all the repercussions.

"The rate of Soviet economic growth has surely passed its apogee, and new rules must be made for an economy with a radically different rate of growth," said Prof. Roy D. Laird, a Russian specialist of the University of Kansas at Lawrence.

In an address to the meeting, he added: "The 1963 crop losses weren't just an isolated failure. The sorry state of agricultural production is forcing the Communist leadership along paths of economic retreat, at least as defined in past society dogmas. This must be paid for by a lowered priority to industry."

#### FUNDS DIVERTED FROM INDUSTRY

Others emphasized that funds are being diverted from heavy industry, which all Communist dogma says must be the preferred industry, and into agriculture and the chemical industry.

Communist Party officials are beginning to listen to farm technicians, although the technicians still don't have a decisive voice in farm methods. Incentives are being reevaluated. And some voices in the Communist world are urging development of a sort of sharecropping system wherever possible to stimulate individual initiative. The Communists, however, are still so wary of such capitalistic devices that they use Marxist jargon when referring to "initiative."

There are other signs that the Russians are painfully reevaluating Leninistic theories on farming and on running an economy, participants at the meeting said. But opinion was that remedies being proposed may not be enough.

#### PRIVATE INITIATIVE SUGGESTED

"The only real solution is to return to private initiative," said Prof. Otto Schiller of Heidelberg University. He added: "But it may already be too late for that. Most farmers have been on collective or state farms for so long that they now wouldn't know how to make the individual decisions required on family farms."

Prof. Alec Nove of the Department of International Economic Studies at Glasgow University, Scotland, blamed the political complexion of Soviet agricultural administration for troubles.

He said: "There must be more autonomy for farm managements, with less control by Communist Party theorists. When you analyze recent developments, it appears that this had been appreciated in words only."

Werner Klatt, a Russian authority at the Royal Institute of International Affairs in London, analyzed some facets of the recently announced \$46 billion plan to expand the Soviet chemical industry. He said, "It is difficult to see how so ambitious a program can be carried out without causing major dislocations throughout the re-

mainder of the economy. In fact, declining rates of growth are being anticipated in various sectors of industry other than chemicals."

Researchers at the meeting also doubted the ability of the Russians to attain chemical goals. Data presented showed little chance of a sizable supply of fertilizers for main grain crops becoming available before 1967 at the earliest. This raises the possibility that another bad grain crop between now and 1968 could force more heavy grain purchasing by the Communists in the West, further depleting Soviet gold and foreign exchange reserves.

A tabulation of such Soviet orders indicated the total may exceed 13 million metric tons in the 1963-64 crop year and may cost close to \$1 billion including freight charges, in Soviet gold and foreign exchange. This compares with net Soviet exports to all countries of six to seven million tons in each of the previous four years, an export that had resulted in hard currency earnings of approximately \$100 million a year for the Russians.

## THE CRISIS IN SOVIET AGRICULTURE—V

AND THE THUNDER ROARED

(By Richard Judy)

"When the thunder doesn't roar, the peasant doesn't pray." Thus does an old Russian aphorism express the peasant's propensity to remember God only when misfortune strikes. Similarly, it took the thunder of a disastrous crop failure in 1963 to force the Soviet political leadership to confront and combat the sources of agricultural crisis in their country. Their strategy is a radical program to drag Soviet farms into the 20th century.

Every American knows that things down on the farm are not what they used to be, but few are aware of the extent to which a technological revolution has transformed agriculture in this country. In 1930, the average American farmer fed himself and 11 others; today he produces enough to feed himself and about 45 others. The technological revolution which made possible this great rise in productivity came in three waves; machinery, chemistry and breeding. Tractors and trucks replaced the horse; specialized machinery for fieldwork and handling materials replaced the scoop shovel, pitchfork and hoe. Mineral fertilizers brought greatly increased yields; insecticides and herbicides banished bugs, killed weeds, and silenced the spring. Antibiotics and feed supplements boosted livestock production. Hybrid seeds and disease-resistant varieties transformed field husbandry.

In the United States, output per agricultural man-hour has increased by about 150 percent since the end of World War II. Crop production per cultivated acre has nearly doubled, and the output of livestock products per head of breeding stock has increased by more than half. Besides obesity, this agricultural abundance has brought the American people surpluses, subsidies, and social problems.

The Soviet farm problem, on the other hand, arises not from surplus but from shortage. Since the twenties, agricultural output has barely kept up with population growth; and since 1958, the food supply has trailed the population increase. The average Soviet peasant today feeds himself and only seven comrades; American agriculture passed that mark in 1900. The revolution in agricultural technology has in fact barely grazed Soviet farming.

People and animals still do many tasks on Soviet farms that would be done by machine in this country. While heavy fieldwork has been mechanized, most post-harvest operations are done by hand. Grain is cleaned, dried, and handled without the aid of mechanical help. Loading and unloading are done manually, and horses and wagons haul most loads on Soviet farms. Transportation off the farms may be done by truck, but these are in short supply.

The primitive state of the road network in the Soviet Union retards regional specialization and hinders deliveries of needed materials to the farms. Even the most basic sorts of equipment—e.g., tractors

and combines--are not abundant. Each Soviet tractor must cover an average of 432 acres while its American counterpart is tilling 66 acres. This shortage of machinery prolongs the harvest and causes losses from shattering and bad weather. Soviet farmers complain of the poor quality and improper assortment of machinery delivered to them; over three-fourths of the equipment models currently manufactured are said to be inappropriate to their tasks. Shortages of spare parts and inadequacies of repair work keep thousands of machines idle when they are most needed.

In chemistry, Soviet agriculture lags behind even more than in mechanization. Only two-fifths as much fertilizer is available in the Soviet Union as in the United States, and for a cultivated area that is nearly twice as large. The average fertilizer dose per acre is less than one-fifth the American level, while Soviet grain yields average 60 percent below those in this country. Most fertilizer available to Soviet fields has gone [into] fiber and oil crops; grains received little.

Production plans for fertilizer have often gone unfulfilled in the past, and lack of fertilizer has been an important reason for low Soviet grain yields. Although fertilizer output has increased in recent years, the amount actually applied to fields has grown more slowly due to large fertilizer exports and losses between factory and farm.

Soviet agricultural experts estimate that about 25 percent of Soviet fertilizer is lost en route to the field. Fertilizer in powder form is highly absorbent, and if handled carelessly it quickly draws moisture from the atmosphere and solidifies. Most Soviet fertilizer is made in the form of powder; and only one-third of it is delivered in bags.

Bulk fertilizer is shipped in railway boxcars, and at its destination it is often simply dumped onto the ground along the siding. Soviet farmers complain that the fertilizer often arrives in a form unsuitable for use without additional processing. Moisture has turned it to lumps and blocks; in some cases, a sledge hammer may be needed to dislodge it from the boxcars.

Frequently, the pile of fertilizer is allowed to stand for a time on the spot where it was dumped; it soon hardens into one of the white mounds to be seen near many provincial rail stations in the Soviet Union. These mounds of fertilizer slowly erode away and, according to Nikita Khrushchev, small boys sled down them in the winter. Even when the fertilizer finds its way to the field, it often gives less than optimum results, because it fails to meet the needs of the local soil. Finally, an acute shortage of spreaders and applicators limits the use of both organic and mineral fertilizer on Soviet farms.

In addition, the Soviet chemical industry supplies agriculture with a grossly inadequate quantity of herbicides, insecticides, and veterinary pharmaceuticals. Soviet specialists estimate that each year about 20 percent of the country's production of field crops is lost to pests and diseases, and the value of these losses [is] put at about 6 billion rubles annually.

Many of the ills of Soviet agriculture can be traced to the very low priority accorded it by the Soviet leadership. The growth of heavy industry and military power has always taken precedence over agriculture as well as other sectors oriented toward the consumer. But rising population and stagnant agriculture have forced Soviet policy-makers to reappraise their priorities. With the population expected to rise from 226 million on January 1, 1964, to 250 million by the end of the decade, the need for more food is pressing.

The poor harvest of 1963 was caused by unfavorable climatic conditions, but it strengthened the hand of Nikita Khrushchev and others who, for some years, have argued in favor of massively increased allocations of resources to agriculture. Ten years ago, in the first years after Stalin's death, a similar urgency to raise food output boosted Soviet agriculture to high priority; the result was the famous virgin land campaign to plow the arid steppe. But no idle acres exist today to be thrust into cultivation. Soviet policy has finally been forced into measures designed to increase yields on the land already farmed.

At a recent plenum meeting of the Party's Central Committee, Khrushchev announced that chemistry would be the savior of Soviet agriculture. He said that fertilizer output would increase from 20 million tons in 1963 to 35 million tons in 1965; and, by 1970, he contended, it would climb to 80 million tons. (The latter figure would be approximately double the American production of plant nutrients in 1963.) Deliveries of fertilizer for grain crops are to rise from their previous very low level to 10 million tons in 1964, 15 million tons in 1965, and 30 to 35 million tons in 1980. The plan also calls for the output of chemical herbicides and insecticides to increase by 650 percent before the decade ends.

The projected growth of agricultural chemistry will demand heavy investments. Plans call for a total of 10.5 billion rubles to be invested in agricultural chemicals during the next 7 years. This sum well exceeds the 6.7 billion rubles invested in the idle and virgin lands during the 1950's.

Mechanization is also to be stressed. The 2-year plan for 1964-65 calls for a great increase in the deliveries of tractors, trucks, and other equipment to agriculture. More than 100 new and modernized types of equipment are promised. Farms are to get fertilizer applicators, storage facilities and livestock equipment.

The main objective of the new policy for agriculture is to raise grain yields from 16.5 bushels per acre in 1962 to 18.8 bushels per acre in 1965. By 1970 the goal is to push grain yields to about 23 bushels per acre. Total grain output would thus rise from 148 million tons in 1962 to about 225 million tons in 1970, if the target yields are obtained.

Can the fertilizer goals be achieved? The first problem, of course, will be to mobilize the required 10.5 billion rubles. These resources, together with those necessary for mechanization and other agricultural investment, will constitute a very large total. But Soviet national income should be nearly 300 billion rubles by 1970. If chemistry and agriculture continue to enjoy their present high priority, there appears to be little doubt that the investment plan can be met. The new 2-year plan for 1964-65 very clearly emphasizes that chemistry—especially agricultural chemistry—has top billing on the party scale of priorities. Agriculture is featured in the second spot. Large and specific appropriations to chemistry and agriculture are mentioned in the 1964-65 budget.

The second problem of developing the fertilizer industry will be bottlenecks associated with the hasty construction and commissioning of large quantities of new productive capacity. Complaints were voiced at the Central Committee meeting in December that new capacity was not being commissioned on schedule. Others bewailed the fact that many new plants were not operating at their designed capacity.



Accusing fingers were pointed at designing engineers who erred in their calculations and botched the technical documentation of new installation. The engineers replied that they were not to blame, since no one would provide them with experimental facilities upon which the designs might be tested. Further complaints were aimed at the factories manufacturing machinery for the chemical industry.

Given the size of the Soviet economy and the high priority that has been accorded the fertilizer program, there is no insuperable obstacle preventing fulfillment of the plan. Imports of chemical plants would help overcome strains on the Soviet designers and builders of these facilities, but they are not indispensable. To argue that the fertilizer plan cannot be met is to ignore the truth that one outstanding characteristic of the Soviet economy is its ability to concentrate material, manpower, and management on a few high-priority objectives. And agricultural chemicals have now been defined as just such an objective.

Will the agricultural chemicals and machines achieve the desired results if they are produced in the planned quantity and quality? This is a somewhat more doubtful proposition. It is unreasonable to expect that the application of fertilizer to Soviet grain crops will have the same positive effect as it has in the United States. The grain-producing areas of the Soviet Union are climatically much colder and drier than most of the corn and wheat belts in this country. Where there is insufficient moisture, the benefit of fertilizer on crop yields is likely to be small.

Most of the grain-producing areas of the Soviet Union are climatically similar to areas in the United States and Canada where little fertilizer is used because of limited rainfall. Thus, on only about one-third of the Soviet grain acreage it can be expected that fertilizer will give good results. Soviet authorities have strongly emphasized that fertilizer must be sent to where it will do the most good, i.e., to the more humid areas. If this is done and if facilities for transporting, storing, and applying the fertilizer are supplied, the prospects for grain production are good.

For the past 2 years there has been a gradual increase in the resources allocated to agriculture in the Soviet Union. The 1963 crop failure was ultimately the result of uncooperative nature, not incompetent management. If the Soviets follow through with their announced chemical and agricultural program, and if rainfall is adequate, it is indeed possible that both the 1965 and 1970 targets will be met.

## APPENDIX

Following is the report by the subcommittee on its hearings on "Export of Ball Bearing Machines to the U.S.S.R." The report was released on February 28, 1961. Senator Dodd refers to the report in his introduction to the present study.

The Senate Subcommittee on Internal Security has undertaken its investigation of this matter not in any desire to find scapegoats, but because we felt that the larger issue involved in the Bryant case was, potentially, of life-or-death importance to America and the free world. We are now convinced, for reasons that are set forth below, that the decision to grant the license was a grave error—an error in judgment which stems from a more basic error in procedure.

In justifying the decision to grant the license for the export of the Bryant machines to the Soviet Union, Secretary Mueller wrote to Senator Dodd on January 18:

"We had originally issued the licenses on evidence which satisfied us that: first, denial of the licenses would not be effective in preventing or significantly delaying procurement of *substantially comparable machines* (our emphasis) by the U.S.S.R. from other sources than the United States; and second, the potential output and utilization of the machines is not such as to represent a significant strategic hazard to the United States. And because our denial action would not be substantially effective from a national security standpoint, its only result would be to withhold a business opportunity from a member of a particular American industry \* \* \*."

With minor modifications, this, in essence, has been the position of the Commerce Department in its testimony to the subcommittee and in subsequent correspondence.

This position was restated by Secretary Hodges in his letter of February 9 to Senator Dodd. The letter reads in its concluding paragraph:

"May I emphasize, in closing, I made the decision to release the Bryant machines for shipment to the Soviet Union on the basis of the best technical information and evaluation that was available to me. This technical information was to the effect that the national interest would not be prejudiced by the export of these machines by an American company, but on the contrary our national interest would be served. In my own judgment of the matter I have paramount considerations of security and have given only secondary consideration to the commercial or trade aspects."

Any Secretary of Commerce, by the nature of things, must rely on the reports of his experts for guidance in such matters. One of the serious questions raised by this investigation is whether the Secretary of Commerce has had at his disposal the highly specialized expert opinion which is essential in making determinations about highly specialized machinery.

The conflict of testimony between the Commerce Department and Defense Department revolved around the following points:

(1) The Defense Department and Miniature Precision Ball Bearing Co. (hereafter referred to as MPB) held the Bryant Model B Centalign machine to be unique. The Commerce Department said that equal, or approximately equal, machines could be obtained from European firms or built by the Soviets themselves.

(2) MPB emphasized that the function performed by the Bryant Model B machine is of critical importance in facilitating the mass production of high precision miniature bearings. The Department of Commerce and the Bryant Co. contended that it is simply one among many equally important functions in the production of precision bearings.

(3) The Defense Department and MPB contended that the possession of these machines would enable the Soviet Union to produce smaller and better missile guidance systems, gyros, and other military items. The Bryant Co. held it probable that the Kremlin plans to use these machines for the manufacture of bearings of lower quality, largely destined for conventional uses.

The subcommittee was greatly impressed by the testimony of the Miniature Precision Ball Bearing Co. and of others who opposed the shipment. But to help throw some independent light on the matter, Senator Thomas J. Dodd, on behalf of the subcommittee, asked for the opinions of 12 private experts in the ball bearing field.

So that they would be familiar with arguments on both sides, the experts were retained as consultants were provided with transcripts of the hearings on the proposed export of the Bryant machines plus the briefs submitted by the Bryant Co. and MPB. They were encouraged to contact the Bryant Co. and the Miniature Precision Ball Bearing Co., and other companies in the field.

All told, we have now received opinions from 12 men recognized as experts in the ball bearing field. Eleven of them are Americans, one is an Englishman. A list of our consultants, stating their present positions and their qualifications, is appended to this report. We have also taken testimony, in a staff interview, from a Russian expert employed by the Library of Congress, who has made an intensive study of the literature relating to the Soviet ball bearing industry.

The list of our consultants is attached to this report. Their statements are printed in the hearing record.

We believe that this testimony gives overwhelming support to the stand taken by the Department of Defense in this matter, and to the arguments presented by MPB in opposing the shipment. This testimony establishes conclusively (1) that the miniature bearings produced with the help of the Bryant machine are used primarily for defense purposes; (2) that the function performed by the Bryant machine is of critical importance; (3) that no comparable machines can at present be obtained from other sources; (4) that Soviet industry has not been able to master the problems involved in mass producing high precision miniature bearings; that the industry is in fact plagued by poor quality and obsolete equipment; that, with its own resources, it would probably take a number of years to develop the capability; (5) that the possession of these machines would greatly accelerate Soviet mastery of the art of miniaturization.

Before proceeding to the recommendations which we wish to submit, we think it would be helpful if we briefly summarized some of the high points of this testimony, and recapitulated some of the essential facts.

1. At least 85 percent of the bearings manufactured with the help of the Bryant machine are used by defense industries:

"Subject machine is a key factor in the economical production of the highest quality ball bearing parts. It enables us to produce a bearing assembly of the highest precision for many important Department of Defense applications, such as the latest guidance systems, navigation, fire control, computer, synchro and servo mechanisms used for aircraft, ordnance, ships, missiles and other space vehicles (statement of Mr. J. R. Tomlinson, president, and Mr. B. L. Mims, vice president in charge of engineering, the Barden Corp., Danbury, Conn.)."

2. The function performed by the Bryant machine is of critical importance:

"The outer ball track grinding operation is one of the last and most vital of those performed on the bearing outer ring. It is the operation which, until the advent of this machine, could probably be called the bottleneck opposing the precision performance of miniature bearings. The necessary perfection of other operations has been achieved 5 to 20 years ago (statement by Mr. H. B. Van Dorn, vice president in charge of engineering, Fafnir Bearing Co., New Britain, Conn.)."

3. The Bryant machine is unique in its field: Secretary Mueller in his letter of January 18, 1961, to Senator Dodd, said that "substantially comparable" machines could be obtained from other sources. Mr. Bradley Fisk, Assistant Secretary of Commerce for International Affairs, in his testimony before the subcommittee on January 24 said that there are "five factories outside of Russia that could make similar machines" (p. 156, transcript). It was not clear from his statement whether the companies he named do, in fact, make such machines, or whether they are theoretically capable of making them. A careful check has revealed that none of the companies named by Mr. Fisk produce machines that can be considered equal or "substantially comparable" to the Bryant machine.

(i) The Manganti Co. of Italy was one of the five listed by Mr. Fisk. Miniature Precision Ball Bearing, in its memorandum to the subcommittee, pointed out that it—

"Was consulted as to the capabilities of the Italian machine when it was in the final stage of development and obtained samples of bearings in late July (1960), tests upon which were completed in August. It was found that on 'concentricity of bore' 90 percent of the bearings were not within the allowed

tolerance and 30 percent had to be rejected because the bore roundness was not within the specified tolerance."

Such a machine cannot be considered "substantially comparable."

(ii) UVA of Sweden was another company named by Mr. Fisk. Mr. Stanley Hensby, technical director of the EMO Instrumentation Co. of Bracknell, England (an affiliate of the Barden Corp.), cabled this information on the UVA "machine" in response to a query from the subcommittee.

"UVA: No equipment machine available. Work is now progressing in field and machine will probably be shown at Brussels show on September 2-12. Feel that it would take several years before production of this machine would become surplus to SKF requirements and available to world market."

A machine that will not be commercially available for several years cannot, again, be considered "substantially comparable."

(iii) The Studer Co. of Germany was also included in the list submitted by Mr. Fisk. Studer machines are in operation, under the same roof as Bryant machines, in both the Barden Corp. of Danbury, Conn., and in the EMO Co. of England. Eyewitness testimony on the relative working capabilities of the Studer machine is therefore available.

Mr. Hensby of EMO said in his cable:

"Studer: No equivalent available. Studer approach is for universal application rather (than) mass production. We have several of these machines in use. Only suitable for small-scale production."

Mr. Tomlinson and Mr. Mims of the Barden Corp., reported:

"\* \* \* the Studer grinder, manufactured in Germany, is a machine which the Barden Corp. has recently purchased and is using in its experimental laboratory in Danbury. This machine is basically a very accurate toolroom machine, but it is not capable of producing accurate bearing races in large quantities with great efficiency."

Such a machine can also not be considered "substantially comparable."

(iv) The Voumard Co. of Switzerland was the fourth company named by Mr. Fisk. The Voumard machine was examined at the Swiss Industries Fair in Basel in the spring of 1960 by Mr. Donald Williams, chief process engineer of the New Departure Ball Bearing Co. Mr. Williams reported that—

"these machines were presumably capable of relatively accurate work. However, these machines do not incorporate features such as fully automatic cycles, including loading and unloading, centerless chucking, and automatic wheel dress and compensation, which are considered prerequisites for production equipment. The Bryant Model B Centalign machine incorporates all of these features."

So much for the fourth "substantially comparable" machine.

Why has American industry been able to produce a machine that the European machine tool industry, with all its capabilities, has thus far not approached? The answer to this was stated by Mr. Tomlinson and Mr. Mims.

"It seems quite logical that, since the large market for highly precise bearings in the United States is supported almost entirely by the Department of Defense, there would be no reason for anyone in Europe to have manufactured a machine tool specifically for highly precise miniature bearings, since the quantities of these bearings used in Europe have been infinitely small compared to the quantities used in the United States."

4. Soviet industry, left to its own resources, is years removed from the production of a machine comparable to the Bryant model B.

Mr. Fisk in his testimony gave some credence to reports that the Soviets were on the verge of producing a comparable or even superior machine.

Mr. Joseph Gwyer, senior research specialist of the Library of Congress, had this to say on the subject of the capabilities of the Soviet ball bearing industry and of that portion of the machine tool industry that supplies it:

"During the last year, the Soviets published a terrific amount of data on the ball bearing industry, the difficulties the Soviet ball bearing industry is facing today, and the availability of modern technologically advanced equipment suitable for the manufacture of ball bearings."

Mr. Gwyer quoted an article in the Soviet "Economic Gazette" (Aug. 27, 1960) as stating that the ball bearing industry had received little of the equipment planned for it, that the production of centerless grinders was entrusted to the Vitebsk Plant, which is not in a position to cope with this task, that the Saratov Machine Tool Plant and the Voronezh Plant had not yet produced internal grinders that satisfy the needs of the industry.

The articles published during the fall period of 1960 said Mr. Gwyer—"have created great concern. As a result of the reports showing the great deficiencies in precision machine tools specifically used by the bearing industry, the Council for Automation and Mechanization, with the Council of Ministers, initiated a field survey during which the machine tool plants responsible for manufacturing equipment for the ball bearing industry were visited. The findings of this special group, or this special investigating body, showed that the complaints were justified, and consequently, the Committee for Automation and Mechanization set a number of points, clarification points and recommendations, in order to improve the condition or actually remedy this situation."

Gwyer quoted a report in the Economic Gazette of October 20, 1960, as stating that "production problems of automatic size control equipment have not been solved for centerless grinders." In the same issue of the Economic Gazette, it was pointed out that it had taken 5 years to build the prototype of a semiautomatic internal grinder, after the machine had first been designed, that this prototype was only half as fast as the machine it was designed to replace, and that it did not produce a cylindrical surface.

Bryant Co., in defending the shipment, argued that, if the Soviet Union could not buy the machines, it would copy them, and little would be gained from a national security standpoint. In support of this, it is pointed out that the Soviet Government is already in possession of certain assembly plans for the Bryant machine.

Addressing himself to this point, Mr. Henry Konet, consulting engineer in the field of instrumentation, said:

"It is necessary to distinguish between giving away secrets, know-how, and capability. Our manufacture of these small devices is no secret—even the manner is not difficult to determine—but the capability to do it well and economically has taken years to develop and should not be sold to a potential adversary. \* \* \* The situation is not one of selling our adversary a 'club'—but machines which help to produce better 'clubs,' faster and cheaper."

When queried about this matter, several of the committee's consultants estimated that, if the Soviets had to build the machines on their own, it would take at least another year to manufacture 45 machines. Mr. Gwyer's estimate was even more pessimistic.

He said that the—"copying of equipment of the nature of precision machine tools enters into a new realm, where the Russians have demonstrated inability and consistent failures \* \* \*."

He pointed out that the Bryant machine was much more complex than the internal grinder which had taken 5 years to move from design to prototype. On the basis of their past record, Mr. Gwyer estimated that it might take the Soviets as long as 5 years to build a prototype of the Bryant machine, iron out the bugs, and then build 45 machines of high quality.

Whether it would take 5 years or 2 years, or 1 year, our national security obviously demands that we stop helping Soviet industry, especially the Soviet defense industry, to overcome its weaknesses. It demands, on the contrary, that we inflict delays on them whenever this is in our power, that we make things more difficult for them rather than easier.

Based on the testimony given at our hearings and on the additional statements which we herewith transmit, the Senate Subcommittee on Internal Security is strongly of the opinion that the machines in question should not be shipped to the Soviet Union.

The Soviets have a considerable edge over us in the thrust of their rockets. We have compensated, or more than compensated for this disadvantage by our own very considerable lead in miniaturization and high-precision instrumentation. If the Soviets could ever achieve near equality with us in these areas, their lead in missile thrust would become a very serious matter.

Before they can close the miniaturization and precision gaps, the Soviets will have to develop an ability similar to our own to mass produce quality miniature bearings. Their press indicates that they are intent on doing this; and this is confirmed again by their eagerness to acquire the Bryant machines. They can obtain, or have already obtained from European sources, machine tools used at other points in the process of manufacturing precision miniature bearings. What they cannot obtain in Europe is a machine equivalent to the Bryant machine in the critical process of grinding the races.

There are 72 Bryant model B machines installed in the United States. We have been informed that on these 72 machines, all of the precision miniature

bearings used by the Department of Defense are, at one point, processed. The 45 machines that will be shipped to the Soviet Union, unless the Bryant license is revoked, include 35 of this model, thus will give them a capability half as large as our own.

If we ship these machines, therefore, we will endow them with a readymade ability to produce precision miniature bearings in quantity. If we withhold these machines, it will almost certainly take them another several years to achieve this capability.

There can be no doubt about the course we should follow.

The subcommittee believes that the Bryant Chucking Grinder Co. acted in good faith and followed all the established procedures in arranging for the export of the Bryant grinders to the Soviet Union. It is to be noted in this connection that it waited until the Department of Commerce had approved the sale before it concluded the contract.

The subcommittee also recognizes that in delivering plans, or partial plans, for the assembly of the Bryant grinder to the Soviet purchasing agency, the Bryant Co., was following an accepted and unavoidable procedure which is the natural concomitant of the sale of equipment. The subcommittee believes, however, that in future, companies which obtain Department of Commerce approval for shipments of machine tools or other complex equipment to the Communist bloc, should be instructed to wait until their equipment has been shipped before transmitting assembly plans or other technical diagrams.

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